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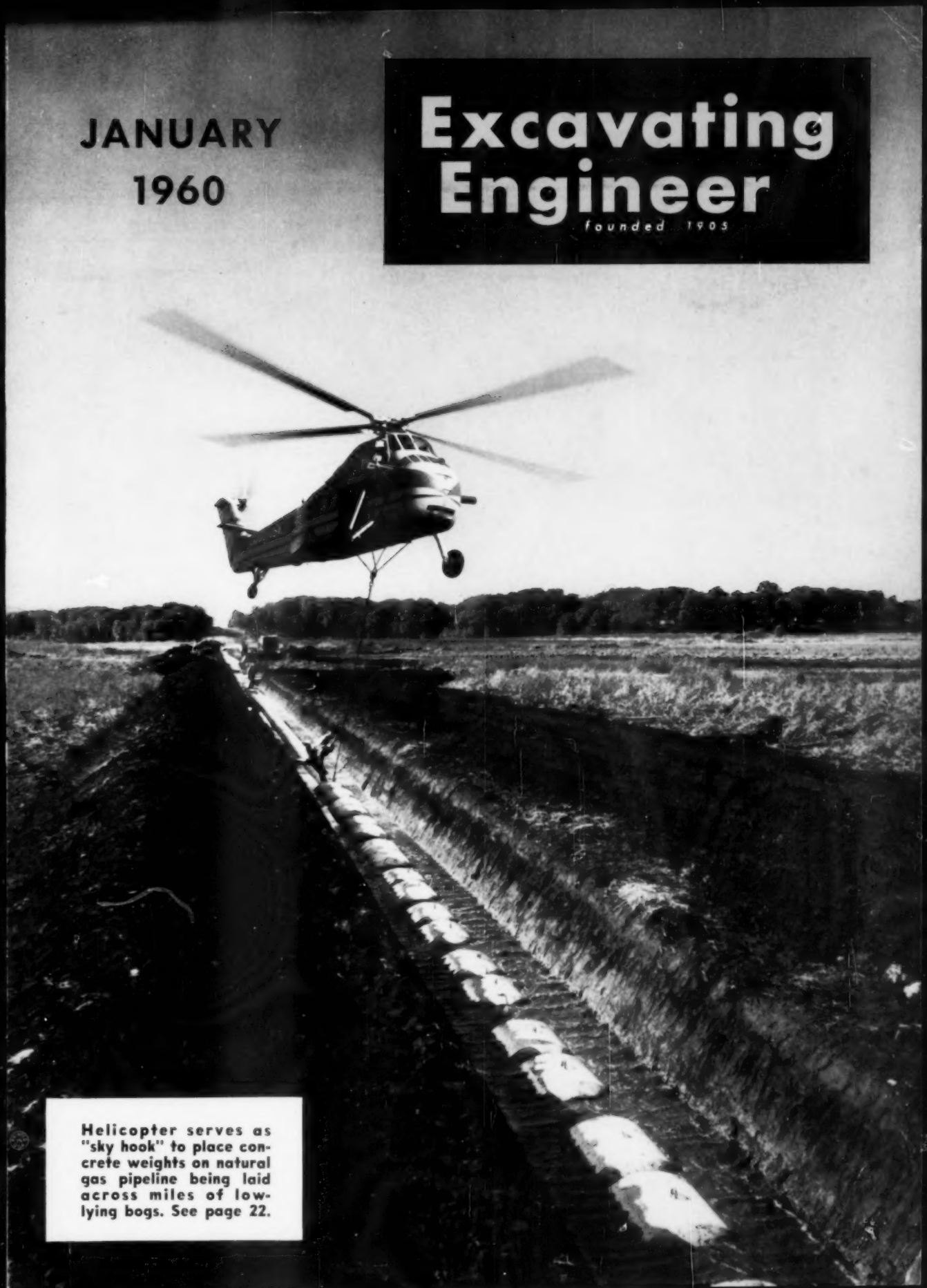
Excavating Engineer

founded 1905



Helicopter serves as "sky hook" to place concrete weights on natural gas pipeline being laid across miles of low-lying bogs. See page 22.

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ROCK ALL THE WAY

The job involved two major sewer projects for the Corporation de Montreal Metropolitan (Metropolitan Commission for Public Works) covering over 22,000 feet of sewer trench budgeted at a total cost of $355,000. Each trench was excavated 10 to 12 feet deep, and 8 feet wide. Every foot of the job was in quarry rock that had to be blasted before the Manitowoc could move in to work.

NO REPAIRS

Taking the severe weather and tough digging in stride, the hoe put out top yardage that would have been good even under ideal working conditions — and with minimum service and attention. On this point Mr. Paul F. Tremblay, Vice President of Civil Construction, Inc., said, "We have spent almost nothing on repairs or maintenance for our Manitowoc hoe since acquiring it last Winter. At the same time, we spent over $28,000 in repairs and maintenance on our rigs of other makes. Yes, we are confident that this trench hoe will more than do its part in giving us profitable operation with a minimum of maintenance and repair costs."

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Excavating Engineer

founded 1905

South Milwaukee, Wisconsin

Advertisers IN THIS ISSUE

Allis-Chalmers	46–47
Bethlehem Steel Co.	43
Bucyrus-Erie Co.	2nd Cover, 21, 36, 42, 52–53
Caterpillar Tractor Co.	29–32, 41
Drake-Williams Mount	51
Eimco Corp., The	1
Euclid Div., General Motors Corp.	17–20
For Sale (Classified)	54–56
General Motors Corp., Euclid Div.	17–20
Hendrix Mfg. Co.	4
Koehring Div., Koehring Co.	6–7
LaCrosse Trailer Corp.	3rd Cover
LeTourneau-Westinghouse Co.	4th Cover
Manitowoc Engineering Corp.	2
Marion Power Shovel Co.	5
Sauerman Bros., Inc.	45

CONTENTS

Volume 54 No. 1 **January 1960**

Florida Quarry Has Bright Future 8

Crews clean up and landscape southern Florida quarry as digging moves along. Far-sighted plan of Three Bays Improvement Co. calls for luxury subdivision on site when pit is worked out.

Safety Can Boost Production—by Floyd Suter Bixby 13

To get more work done on jobs, take a tip from this contractor—safety pays.

Flyer and Diver Aid Pipeliners 22

Helicopter, skin diver are called in as pipeliners battle Minnesota mucklands.

Trinity Dam Harnesses High Watershed—by Ray Day 26

Here's how the dam, tunnels and powerhouses of one of California's largest current water-use projects fit into overall plan of the Central Valley system to supply water-deficient areas.

Ex-Laffs Page 37

Caterpillar Releases Seismic Analysis Data 38

A simple geophysical technique is helping the earthmoving industry eliminate some of the guesswork in bidding earthmoving jobs, by determining the rippability of sub-surface rock.

Not in the Contract 40

News From the Field 44

Small Contractors Share in Road Program 44
Kolbe, Morris Elected to New Posts at United Electric Coal 44
Highway Cost per Mile Is Down 44
P. H. Birckhead Retires 44
New Garavaglia VP Named 44
Oliver Mining Chief Dies 45
T. G. Paulsen Dies 45

Equipment You Ought to Know About 48

New Trade Literature 51

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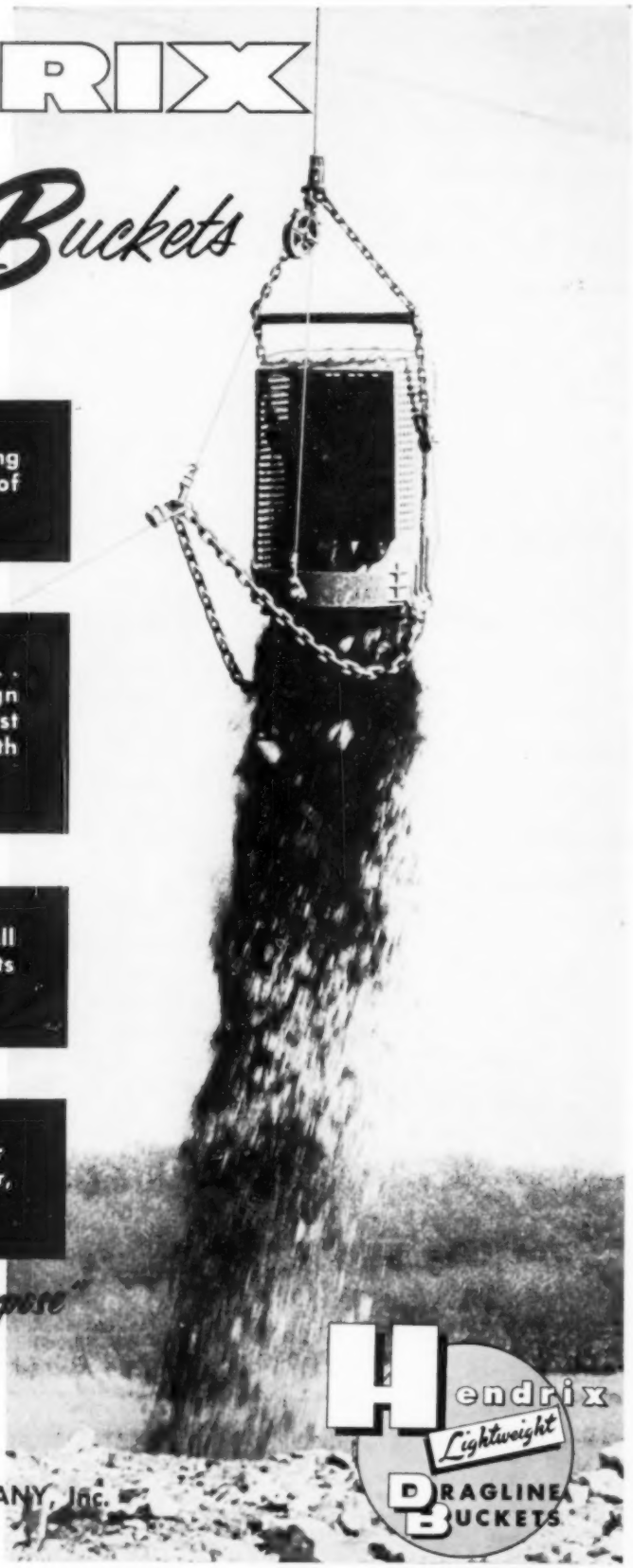

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This is a picture of the solution for an unusual problem—involving a 160-foot boom, the world's largest on a quarry shovel.

A "special," it typifies Marion's ability and willingness to go to unusual lengths to solve customer problems.

The machine is a Marion 5323 which carries an 11-yard dipper, 95-foot handle and 160-foot boom to deal with a rocky bank ranging up to 135 feet in height. This machine's ability to dump 326 feet away from the wall made it the ideal answer to this big quarry's problem.

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1 SKOOPER loading solves split coal seam problem

IOWA — a split seam of good quality bituminous coal created a real loading problem in large open-pit mine. Top seam — about two feet of coal — was separated from bottom seam by a two-inch layer of fire clay. Conventional shovel loaders mixed clay in with coal, caused too high an ash content. Solution — Koehring 205 Skooper! Its 7-foot level crowd took off top coal seam, fast, without mixing in clay. No ground grinding skid-turn action of tractor loaders, either, because full revolving Skooper swings through complete loading cycles without track movement.

15-yard truck loaded out every 3 minutes

TEXAS — Loading packed caliche out of stockpile, Skooper heaped 15-yard trucks in about three minutes. That's five yards a minute with an excavator which is basically a ½-yard machine!

2 400 tons an hour with only 64 horsepower

OHIO — On highway construction, Koehring 205 Skooper was clocked loading loose borrow into trucks. Time studies showed a production rate of 400 tons an hour for the 64 h.p. machine equipped with 2½-yard rehandling bucket!

Keeps production high at sand and gravel plant

UTAH — Loading pit-run material at a Utah sand and gravel plant, Skooper's continuous production dig-swing-dump cycles let operator load trucks at top efficiency all day long. No late-afternoon drop-off, common with front-end tractor loaders. Skooper power is concentrated on digging effort, not on traveling.

3 Macadam break-out easy with 7-ft. level crowd

LOUISIANA — Preparatory to repaving city street, old macadam surface was peeled off and loaded out by Skooper alone. There was no ripping or breaking ahead of the machine. Skooper's powerful bucket action provided all necessary break-out force. Its 7-foot level crowd also helped maintain grade, kept dozer and grader work down to a minimum.

COLORADO — With a similar pavement removal problem, an alert Colorado contractor also used Skooper with equally good results! Loaded heavy oil-saturated blacktop, kept one lane open to traffic during construction.

4 Steady diet of foundry sand

ILLINOIS — Skooper owner has long-term contract to supply used foundry sand from industrial plant

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KOEHRING

yard. He sells it to other contractors for use as subgrade material on parking lots, roads, etc. Skooper replaced a tractor front-end loader on this work. Owner reports Skooper not only compares favorably production-wise with the old machine, but maintenance and fuel costs are substantially lower! It's an ideal high-production application for full-revolving, free-swinging Skooper. Plenty of reach for loading the big, high-sided trailers, too! Clearance height under roll-over bucket is 12'-10" at beginning of dump — and more than 10 ft. after dumping.

5 Cleans ditches, trims banks along state highways

KENTUCKY — Highway department's Skooper has just the right combination of advantages for below level ditching, grading shoulders, trimming banks. Bucket reaches below grade, above grade, cuts at any angle of bank slope. "Stand-still" digging cycle with 360° swing for dumping into trucks speeds every assignment — keeps one lane open to traffic while work is underway. This same machine solved a real emergency last Spring.

Cleared landslides

Heavy rains caused a road maintenance nightmare along Kentucky's Ohio River valley. Tons of soggy mud and debris came tumbling down, blocking sidehill roads. Railroad tracks downhill, closely paralleling roadway, prevented dozing debris over the edge. Material had to be loaded out, hauled away in a hurry. Skooper was brought in — quickly cleared one lane — let traffic through while it cleared second lane. Big, wide bucket easily handled largest boulders, stumps. 7-foot level crowd did a smooth job on final-grade cleanup. Emergency solved, Skooper moved on to next assignment!

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Excavating Engineer
founded 1905 JANUARY 1960

Fire in the hole! Geysers show location of shots in Florida quarry which will someday be a peaceful surburban section.

Florida Quarry Has Bright Future

MUST a quarry become a community eyesore? Many producers prefer to sidestep this problem. No room in our budget for beautification, they claim. Now a Florida firm reverses the trend with a plan that's practical—and profitable at the same time. Three Bays Improvement Co. pans paydirt from its pit today, and looks forward to even greater value from the land in the future.

Here's the idea. Instead of scarring the landscape with piles of overburden and random cuts, the excavators follow a careful digging pattern. When they're done, this will be transformed into a first-class lakeside subdivision, not a pockmarked no-man's land.

Perhaps toeing a fixed line could hobble output of crews in the pit. But Bill Hawker, top push on the job, does not let it happen that way. He worked out drilling shortcuts that slashed footage costs in some of the hardest coral rock in southern Florida. He streamlined digging to avoid production-killing delays. Result: his team loads out 1,900 yards each shift, blasts and stockpiles more than enough to back up this red-hot pace.

Three Bays mines a thick lode of coral in its quarry near Perrine, about 30 miles south of Miami. This section of Dade county still lists truck farming as its major industry. Ton upon ton of fancy vegetables—tomatoes, potatoes and corn, among others—move to northern markets each winter from the rich muckland acres.

Equally busy traffic in the other direction bids fair to change the whole picture now. Each week over 3,000 northerners move to the Sunshine State. Nearly two out of three of these new residents, lured more by booming commerce than Gold Coast glamour, settle within commuting distance of Miami.

Southern Dade county stands almost at the crossroads of the boom. This presents a golden opportunity for Three Bays. Today, a ready market for

Crews clean up and landscape southern Florida quarry as digging moves along. Far-sighted plan of Three Bays Improvement Co. calls for luxury subdivision on site when pit is worked out.

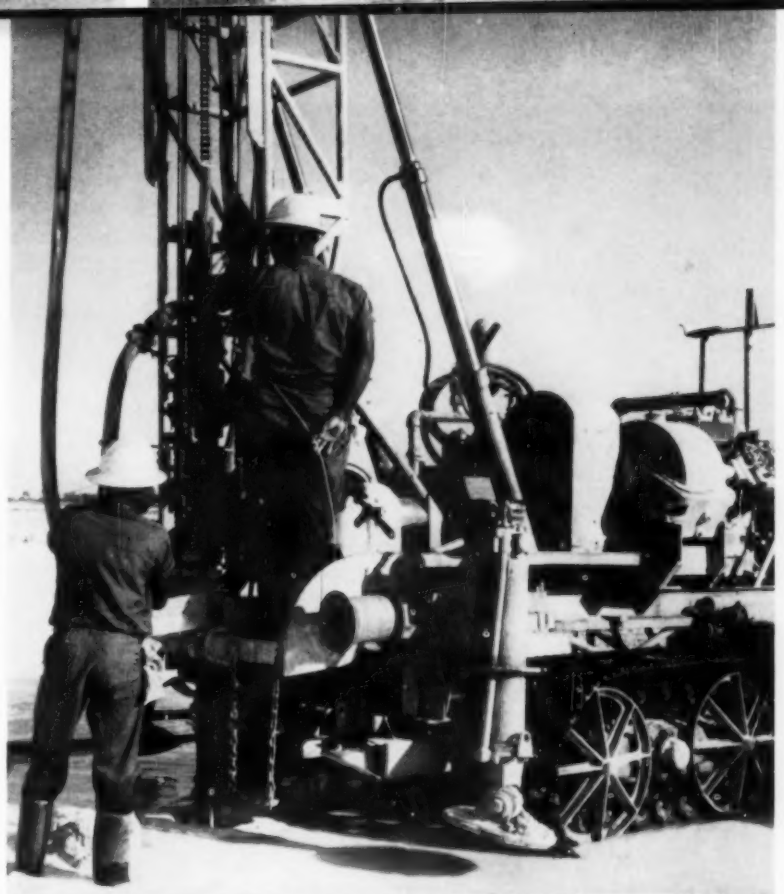
rock products. Tomorrow, choice homesites for sale in a most desirable area.

In the wild crop of new suburbs that grew up around Miami in recent years, sections of southern Dade bloomed as garden spots. Colonies of plush homes dot the choice high ground and waterfront lots. And even in a state with 3,700 miles of shoreline, water frontage commands top prices—when it's available.

Water is Boon

So the high water table that plagues most work in south Florida stands to be a boon, not a bugaboo. Just picture the flooded pits 10 years from now. Flooded pits? Hardly. They are sparkling lakes bordered by clean sand. Rows of fine homes on tree-shaded lots line the beaches. That's the dream that the draglines and haul wagons shape in the pit today.

Bill Hawker proudly points out how far his men have gone in two short years toward pinning down this dream. The big lake—the one they're working on now—stretches over a quarter-mile from shore to shore. Rows of young palm and mango trees are already planted along the smoothly graded strip.



A stick of dynamite with detonator in place is put down the hole. Mayhew drill, powered by GM diesel, carries own air and hydraulic power. Athey tracks are firm base.

Pit boss Bill Hawker shows modified bit with carbide tipped slugs welded on it.

"Pretty soon we'll start grass out here," Bill explains as his pick-up coasts to a stop at the edge of the lake. He reaches behind and pulls out a wrinkled site plan. His finger traces the profile of the two lakes planned for the property. In cross-section they look like huge dishes. At the shoreline, a gently graded lip ideal for easy wading. Then a short stretch of steeper slope before the vertical drop-off to 35-ft. depth.

The water that covers the lot makes blasting tricky because the drill gang must pull to full depth in one lift. It also poses problems in loading the holes. Three Bays brought in a big gun— a Mayhew drill—to win the blasting battle.

The men handle their job like a crack drill team. A Cat D4 tractor spots the rig at the end of a line of five holes, usually in ankle-deep water. No problem with footing, though. The men stripped the original tires and mounted the drill on Athey tracks. This switch clipped more seconds off set-up time, too. On most holes the men do not even bother to set the hydraulic outriggers because the drill stands firm on its broad tracks.

Even when the going is good, the drill crew has no cinch. Mother Nature planted a booby trap right in their path. A band of flint-hard coral (it scales way up near 35 on the Los Angeles rattler test) runs across the tract. Bill Hawker guesses the formation is one of the original reefs that make up Florida's backbone. Where it came from is not important—getting it out is. The men have that trick down pat now.

Listen to Bit

With the drill on target, the crew boss swings the feed lever. The big kelly bar, tipped with a job-modified bit, churns the milky water, then bites into the rock. The drill tender charts his way by ear, listening to the whine of the drill, guiding the bit swiftly through sand lenses, bearing down more when the big gun lugs against hard coral. He does not let the bit spin without chewing; nothing wears tips faster than grinding away on

(Above) Big dragline casts 4½-yd. bucket into flooded cut. (Below) A 38-B loads Cat DW15 hauling units from stockpile as new stockpile is being built in background.

solid rock, especially with loose sand to act as an abrasive.

It takes just over two minutes to sink the 33-ft. hole. When the bit bottoms out, the tender stops the drill. He reaches into a box alongside his station and grabs a stick of dynamite. Trailing from it is the primer cord already embedded in the stick.

Into the open top of the hollow kelly bar goes the dynamite. No tangle of wire underfoot, though, as the primer cord unreels from a spool in a rack welded alongside the mast. Quickly, the operator drops in more 40% strength dynamite, nine sticks in all with two cardboard spacers. Treated for long life underwater, these paper tubes give better results than jobsite make-do's, and cost only a nickel apiece. Below water no stemming is needed. Dry-top holes get 10 feet of sand stemming.

Five-Minute Cycles

After a powder monkey snips off the primer cord, the drill tender eases the kelly bar out of the hole. Then a worker wraps the cap around the primer cord and lays it out in the open. Now the tractor moves in the drill 10 feet to start the next hole. Time from set-up to set-up: about five minutes. When everything's clicking, the crew sinks 40 to 45 holes in a 9-hour shift.

The men shoot five holes at a time to pull a 50-ft. wide digging pass. (This width gives good cycle time for the

draglines, and plenty of room for haul unit turnaround.) Delays up to 50 milliseconds give good breakage by pushing the rock toward the completed cut. Good powder ratio reflects the blasters' skill. They pull 4.4 yards of rock per pound of powder.

No research on this job proved more rewarding than the hunt for a long-wearing bit at a down-to-earth price. They found it, a simple job-designed modification that slashed bit costs 80%.

At the start, the drill crew used 4¼-in. Mayhew bits with carbide inserts. The tough coral took its toll in fast wear. Trying to salvage worn bits, Bill Hawker ordered some Austin carbide-tipped slugs—finger size inserts that renew the bite of coal digging machines the way replaceable teeth put new life in shovel dippers. Bill figured to drill holes in the worn bits and tack in the slugs.

First, though, they tried four slugs welded *outside* a bit, one at each of the compass points. This hit the jackpot. The outside teeth bite in first, cracking the solid rock, and then the bit itself chews easily though the coral. The modified bit opens a 5½-in. diameter hole.

Bit life skyrocketed after the crews switched to the new design. On the average now, a single bit lasts for 300 holes before it has to be replaced. And Kelly bar wear dropped off sharply. The crew kept tabs on the latest bar. The record shows one end lasted through 1,838 holes—11½ miles. Reversed, the bar went another 3,450 holes. Total hole drilled with a single kelly bar equaled 33 miles.

Build Stockpiles

Three Bays mines coral in typical Florida fashion. Draglines dig out the shot rock and build high and dry stockpiles. After a dozer clears a sloping ramp, another dragline climbs to a perch atop the pile to load haul units.

Bill Hawker picked his excavators for top output on the long haul. He's more interested in dependable performance shift after shift than setting a machine-killing pace. So he put big draglines on the big job—pulling shot rock from the flooded lode.

A Bucyrus-Erie 88-B sparkplugs the operation. It wields a 4½-yd. Hendrix dragline bucket tailor-made for heavy-duty digging. This burly mining bucket proved a good choice for work in the coral. Built up at the stress points, it stands up well under the punishing service it gets.

The 88-B runs through its cycle ef-

Shooting for Safety

FACING up squarely to the problems of blasting in a populated area, Three Bays uses a seismic yardstick to call its shots. The aim is safety, first and foremost, for workers and for property owners beyond the quarry fence. Periodic tests fix the number of holes and amount of powder in each shot at a level that is well below the danger point.

Equipment and know-how for the safety checks is provided in a package deal set up by Vibration Measurement Engineers, Evanston, Ill. Bill Hawker, pit super, runs the test himself once a week.

Setting up for a reading on a street behind the quarry, he looks more like he's catching a plane than checking blast levels as he lifts a small suitcase-like kit from his pick-up.

Setting the case on the ground, he unsnaps the cover and sets it aside. He checks a circular level and adjusts the case till the bubble is right on the bullseye. Bill knows the distance from here to the blast—he checked that beforehand. Now he clicks a switch and signals the powder boss. Only a thin spray of water indicates the shot has gone off.

Bill shuts off the battery power and pulls a black box from a trap door in the face of the instrument panel. This is the camera. On its sealed-in film is recorded the character of the blast.

Bill mails the camera and blast data sheet directly to VME at Evanston. They develop and read the film. Its wiggly lines tell how much blast vibration reached the spot where Bill had stood. Then a report card comes back to the job: green tinted for safe blasting level, yellow if a little caution is indicated. Bill has never gotten a red card but he knows that if the film ever shows danger, VME makes an immediate phone call to the job so no time is lost before adjustments are made.

Greatest bonus of the check system is peace of mind. The shots are safe. But even so, if a neighboring home owner claims his bedroom wall is cracked, the report can prove that blasting didn't do it. Courts have accepted the seismic records as evidence that shots are within safe limits.

(Above) Hawker proudly shows tree-lined streets being built as part of quarry operation in Miami suburban area. (Below) Hauler dumps coral rock into crusher.

fortlessly. Bucket swinging wide, the rig turns toward the water. The shovel-runner fingers his controls smoothly. Air-powered "muscles" do the work. Sending up a geyser of foam, the bucket hits the water a box-car length out from the boom point.

The rig's Cummins diesel growls steadily as the drag rope winds in. When the bucket breaks water, it carries a heaping payload of gray-white coral. In one motion, the operator hoists the bucket and speeds the machine into its swing. Almost without stopping, the bucket spews its load atop the stockpile and swings back to repeat the cycle. Even in this tough, blind digging, the machine moves more than 1,500 yards of rock every day of operation.

Rounds Out Team

Another dragline—a 71-B with a beefed-up Esco bucket— rounds out the digging team. Working a separate cut, the 71-B pulls out 3½-yd. bites of coral with each swing. It handles about 1,000 yards a shift.

Loading moves fast with a 38-B dragline on the stockpile. The rig handles 1,900 yards each 8-hour shift.

Output stays high because the dragline works almost a straight dig-and-load cycle, with hardly any swing. The haul units pull in right under the dragline's boom. The 38-B heap-loads its 2-yd. bucket, swings it out and drops the coral into the wide top of an Athey side-dump hauler. Total cycle time is about 30 seconds.

Three Athey trailers, drawn by Cat DW15 rubber-shod tractors, carry the rock to a crushing plant run by Rockdale Stone, a Three Bays' affiliate. It's a two-mile round trip, but the rigs make top time on well-tended haul roads. Two graders (an Adams and a Cat No. 12) blade the surface continually, and it pays big dividends. The hauling rigs hit higher speeds on the super-haulways with less wear and tear on engines and transmissions. Tires last longer, too, without ruts and loose rock around.

Three Bays' idea of planning quarry growth with an eye to the future has appealed to other producers in the area. Some development builders came up with a variation on the plan. They dig lakes to increase property value. The coral they pull out is used to pave their roads.

Three Bays operations are headed by W. A. Troup, president. F. G. Murphy and C. T. Stockton are vice presidents. H. E. Sydenstricker is secretary.

Safety Can Boost Production

To get more work done on jobs, take a tip from this contractor — safety pays.

by Floyd Suter Bixby

Jack R. Duncan (left), safety director, exchanges ideas with Ray Wells, industrial relations manager. The two men have worked out an excellent safety program.

IS AN accident prevention program really worth what it costs the average contractor?

Fisher Contracting Co. can answer that question with an emphatic "yes." In a five-year program Fisher, one of Arizona's biggest contractors, has dropped the frequency of its lost-time accidents from 63.19 to 19.91. In one year it hit an all-time low of 5.98. What's even more significant—and this is where the real saving in human suffering and insurance premiums come in—the severity rate has dropped from 9.75 to 0.387.

The dramatic result can be shown in another way. Near Holbrook, Ariz., on U. S. 66—which is called "the Main Street of America" because it's one of its most heavily travelled highways—Fisher had under construction what was Arizona's biggest single highway contract when it was let. To handle traffic through that project, it was necessary to make six road closures and three detours. Ordinarily, road closure barricades are a menace. Accidents are a foregone conclusion.

But here's what happened. Fisher's safety program, carried through the work season of 1958, the winter and half the 1959 construction season, resulted in all that traffic control without the scratching of a single fender. The safety accomplishment was so remarkable that grateful officials of the Arizona state highway department sent Fisher Contracting Co. a letter of commendation for its leadership in accident prevention.

Impromptu on-the-spot safety meetings like this one between an excavation foreman and his crew of operators, form the backbone of the program. Job is on U. S. route 66.

Won Awards

Fisher's accomplishment can be expressed in still another manner, this time in the field of honorary awards. Last year Howard Pyle, former governor of Arizona and now president of the National Safety Council, presented the Fisher firm with the National Safety Council's fleet safety award and industrial safety award on behalf of Arizona's Maricopa County Safety Council. It represented high achievement.

But while awards and scores and the mechanical prevention of accidents are good, there's one place where an accident prevention program counts even more for an excavating contractor. Nothing

(Left) Here is a typical rock cut on one of Fisher's jobs. (Right) Blasting in these cuts is carefully controlled. Shooting all explosives the same day they are loaded into holes to prevent exposure overnight to thunderstorms is Fisher's latest safety rule.

on any earthmoving job is more important than the production line, and that's the thing which suffers most from accidents. Jack Duncan, who handles Fisher's accident prevention under Industrial Relations Manager Ray Wells, has an interesting theory about accidents which illustrates the point perfectly. He expresses his philosophy this way:

"First what is an accident? Most of us think of an accident as being a personal injury and/or damage to property or equipment. What an accident really is is an interruption of production, sometimes involving personal injury or damage to equipment.

"If you take a close look at accident costs, you will find that for every dollar of direct costs there are four dollars of indirect costs. These are hidden costs, not readily determined by the stroke of a pen.

"Briefly this could be expressed as down time of equipment, the cost of repairs, idle manpower represented by men leaving their jobs to view the scene of the accidents and to take the injured to the doctor, additional investigations and reports, the possibility of procuring new materials, and factors like that."

Duncan also explained how a mere incident, or near accident, can be regarded as an accident. He tells about a Minnesota power company which analyzed what its near-accidents did to production. For example, suppose a lineman dropped a pair of pliers from atop a pole. What are the results of that incident? The lineman must climb down the pole, pick up the pliers, wipe them off, climb back up the pole, secure himself, and get back in his original working position. No one was working beneath the lineman at the time of the incident; consequently no injury was involved. Nevertheless there was a very definite interruption of production.

Consider still another example a bit closer to home so far as the average excavating contractor is concerned. This is an example that can happen frequently. It has even happened to Fisher Contracting Co.

On a typical highway job the structure-excavation clamshell bucket is taken off a crane and the machine is moved over to a bridge location to erect a heavy panel of ganged concrete forms.

The *Kingfisher*, a friendly little fellow, introduces Fisher's safety program to employees and to the public by appearing on equipment and detour warnings.

The lift is heavy, and the operator for some reason fails to check the cable laps on the drum of the crane. The forms are picked up and swung over the heads of several carpenters.

Just before being landed at the bridge location, the drum wedge suddenly lets go. The form panels are dropped but they luckily hang up in an upright position against footings already in place. So the forms are undamaged, there is no damage to the crane, and fortunately even though three or four men could have been killed by the incident, no one was touched.

But there was production delay. Carpenters had to repair the scratches on the form surface. The crane operator and his oiler replaced the hoist drum cable. Reinforcing-steel workmen stood idle for 15 minutes.

The insidious thing about this type of delay is that it steals production time which, all too often, goes unnoticed by the front office, by the safety director and by company management. It's one of the commonplace little incidents on a construction job, says Duncan.

An analysis by Fisher's safety department shows that about 85% of all construction-job accidents are the result of unsafe acts. Further, it is estimated that for every 300 unsafe acts there will be 29 minor injuries. For every 29 minor injuries, there will be one lost-time accident.

Carrying the analysis further, each lost-time accident costs a contractor an average of $5,250. Fatalities occur about once per 105 lost-time accidents. These statistics were recently verified by Thomas M. Lively, engineering consult-

This stunt saved a small home which stood in the way of blasting crews. Euclid end-dumps were parked with beds upraised to protect the structure from any flying rock.

ant, at a National Safety Congress in Chicago.

Construction is as dangerous an industry as mining, lumbering or quarrying. It kills more men in accidents each year than it brings into the trade through apprentice training. There is no way of estimating production losses through near accidents, even where no injury at all is involved.

These grim statistics are in the forefront of Fisher's safety program on every job. While it goes without saying that the big aim is to avoid severe injury, fatalities and major damage to equipment, the safety program also tries to avoid production-time losses of the type cited above. An accident prevention program can be more than justified if it does only that, according to Fisher's top men from President Del Fisher right down through job foremen.

To see the program in action, let's take a field trip through a typical Fisher job, starting before the contract work begins.

Duncan's usual procedure, when the company has been successful on a contract bid, is to make a visit to the nearest town about two weeks before work starts. In this visit his main aim is to size up the medical situation. He contacts each doctor in the town, and makes his selection of the official job physician. If there's a hospital in the town, he makes whatever arrangements are indicated for hospital cases. Ambulance, taxi, fire and police emergency facilities also are checked into, so that all this data can be furnished to job employees the day the job starts.

At about the same time, the superintendent meets with Duncan and all key foremen, along with any employees assigned to the job. At this meeting, the chief topic is accident prevention, a reminder to use approved company doctors in emergencies, and the like. Duncan and the job superintendent also cover the traffic-control situation, making certain that necessary signs are ready. Some 4x8-ft. plywood signs are used to remind everyone that safety will be respected throughout the contract.

Flagmen Handpicked

Few people really pay much attention to signs. That's why the signs are followed up by flagmen who are picked very carefully. Some companies feel that anyone can be a flagman. Fisher's management doesn't. Flagmen are picked for alertness, intelligence, appearance and ability to deal with people. They receive a booklet acquainting them with approved signals and the purpose of traffic control. They receive reminder instructions from Duncan, again and again, that they are to treat the public courteously but firmly. For example, there's no reason why a flagman can't walk over to a car he's had to stop, and explain to the driver there is blasting up ahead and there will be about a 10-minute wait.

Goggles, hard hats and other safety appliances are furnished to Fisher employees. On earthmoving jobs, scrapers have been equipped with safety belts, but Duncan leaves it strictly to the operators whether the belts are used or not. On a recent contract that policy paid off. The job was exceptionally dangerous, and because there was a good chance a scraper could turn over, the operators chose not to use their safety belts. One unit plunged off a bank and turned over twice. But the driver, unimpeded by a

AN ACCIDENT'S HIDDEN COSTS

The direct costs of an accident are those relating to medical and compensation expense. But it's the hidden costs which shock thinking contractors. These include:

1. Time lost from work by the injured man.
2. His loss in over-all earning power.
3. Economic loss to the injured's family.
4. Lost time by fellow workmen.
5. Loss of efficiency due to breakup of crew.
6. Lost time by supervisory personnel.
7. Cost of breaking in a new man.
8. Damage to tools and equipment.
9. Time damaged equipment is out of service.
10. Spoiled work.
11. Loss of production during accident and beyond.
12. Spoilage (fire, water, chemicals, explosives, etc.).
13. Failure to fill orders or contract commitments.
14. Overhead cost while work is disrupted.
15. Miscellaneous. There are an estimated 100 other items of detailed cost which appear one or more times with every accident.

At national safety award presentation are from left: Safety Director Jack R. Duncan and Mrs. Duncan; Vice President and Mrs. Elmer Clark; Arizona's Governor Paul Fannin; National Safety Council President Howard Pyle, former governor of Arizona; President and Mrs. Del Fisher; and Industrial Relations Manager and Mrs. Ray Wells.

safety belt, was able to leave the machine safely. In safe but rough riding, drivers like to use the belts.

Job foremen bear real responsibility for safety. That came about several years ago, when Duncan started dreaming up different safety letters which foremen read to their gangs in "toolbox" meetings. In addition to foreman-induced safety, Duncan personally holds a job safety meeting for about 30 minutes, every other week. Accidents are analyzed, safety is related to the job in terms of increased production, and men also come in for their share of credit.

Public credit, incidentally, is a big part of the accident prevention program. Many ways of giving employees proper recognition have been devised. Two Euclid drivers on a cement plant job near Clarkdale, Ariz., were singled out for commendation when they managed to stop, with heavy loads, when workmen wandered into their path unthinkingly. A fleet safety program for truck drivers results in a "Driver Of The Month" and "Driver Of The Year" award.

Duncan doesn't hesitate to run contests between drivers and between crafts. In the truck driver dispatcher's office is a board with all driver's names posted. Gold stars are placed by the names of drivers who haven't had an accident. Blue stars are placed if there's been an accident that's classed as non-preventable. If a truck driver has a preventable accident, however, a red star is placed beside his name for a six-month period. Drivers will do about anything to prevent those red stars.

Promote Rivalry

Contests between various crafts for safe work performances also are run all the time. Incentive rewards have been given so that many Fisher men are now well stocked with personal items such as billfolds, ashtrays, lighters and so on. Bigger rewards are now being made in the form of cash awards, travel alarm clocks, football-game blankets and such items.

There's no question in the outside public's mind that this is an unusually safety-minded organization. Both Wells and Duncan participate, safety-wise, with city, county and state safety groups. The entire Fisher organization worked hard for the fleet safety award which was won last year.

It seems sometimes that Duncan goes to great lengths to dramatize his program to the outside public, but here again it pays. On a typical rock job, where blasting is a necessity, Duncan goes around to visit people in the immediate vicinity. He explains what they're doing, and emphasizes that they're leaning over backward to avoid any damage. Duncan likes to go around with the owner of a house to inspect the walls for cracks before any blasting is done. Most houses have some cracks; people just don't know it until they start looking for them after a blast.

Duncan also lets people in on the use of their seismometer, which records shock intensity. He urges people to come around to see him set up the instrument, and watch how it works when the blast is pulled. It helps to keep down claims.

Outside talks, particularly to school children, are doing much toward accident prevention. Duncan has found that even children will cooperate to a great extent if someone they like explains, in language they can understand, the necessity for staying away from dangerous construction machinery.

Duncan's job is in many respects like a minister's. Constantly in his mind is the necessity for making new approaches in his safety talks, which will keep the men interested. It doesn't have to be too dramatic, just something which will command interest. One of his best lectures, for example, was started with a pair of shoes . . . empty shoes. Duncan then related safety to every man who filled those symbolic shoes.

So far as routine details of accident prevention are concerned, they can be found for any type of job, including excavation and earthmoving, in the AGC Safety Manual. But while these rules are important, it takes more than that. It takes the wholehearted approval, endorsement, and backing of the head of the construction company. Duncan has this backing from Del Fisher.

Significant Benefits

In terms of dollars and cents, the program has paid off in many ways. Human suffering, represented in the severity-score drop, can't really be measured. But in insurance premiums alone, the program is saving enough each year to pay Duncan's board and keep, and to buy a new Caterpillar DW21 besides. The earning power of the DW21 or some other machine of comparable price could boost the saving even more.

What safety has done for Fisher Contracting, in short, has been to boost production and morale, to make good men better, and to reduce human suffering and ultimate cost of doing business. Nobody could ask more of any program than that.

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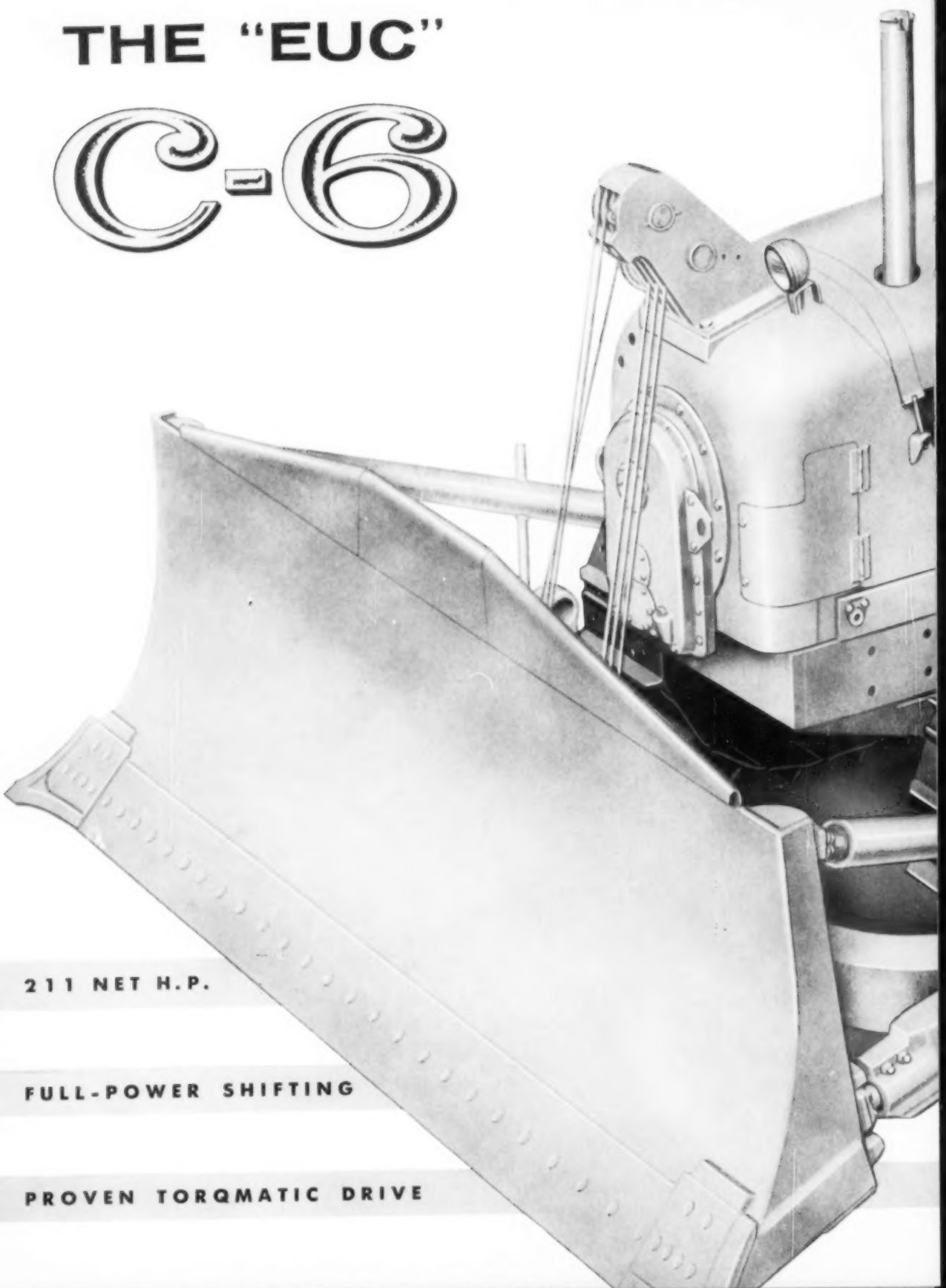

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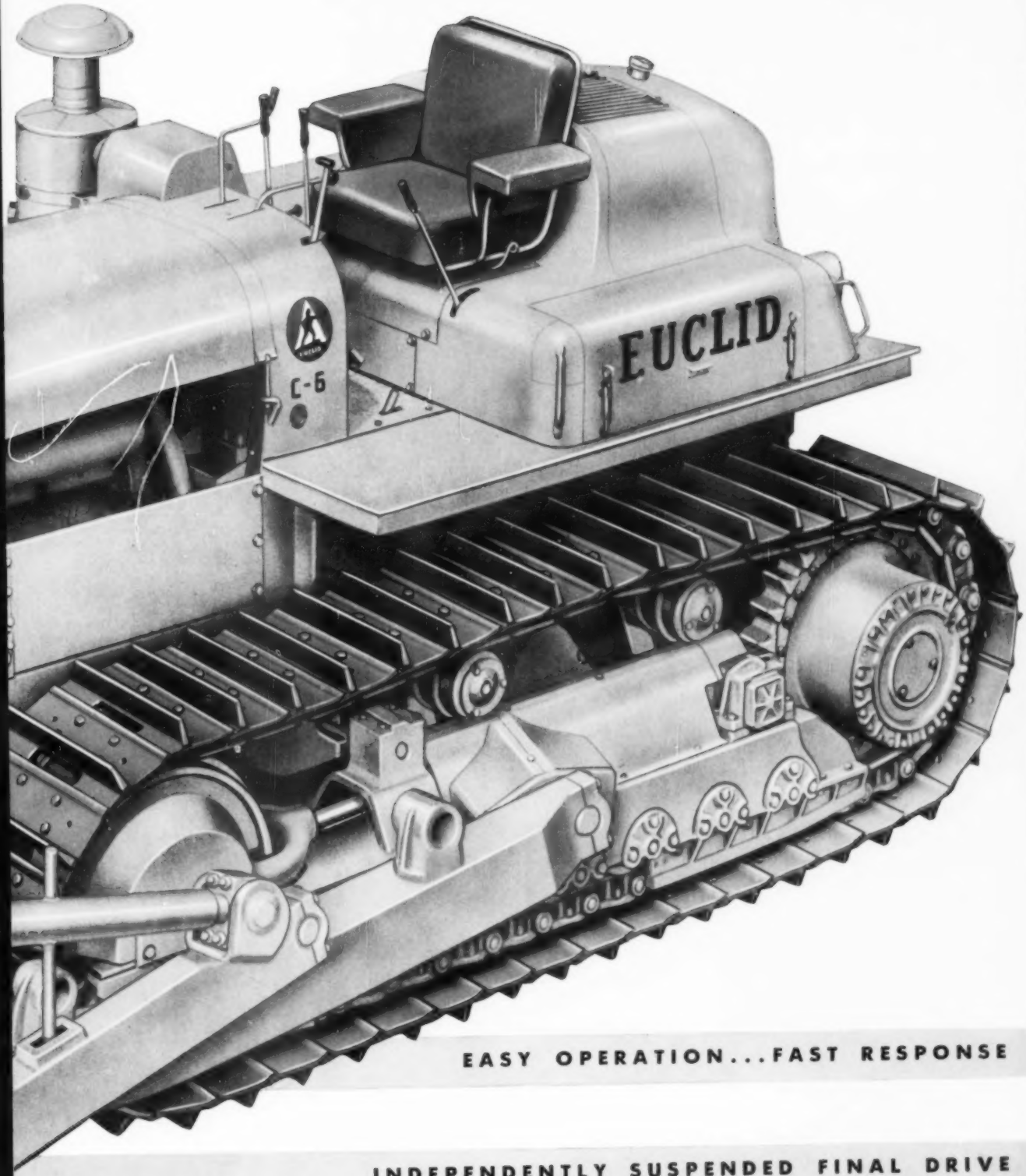

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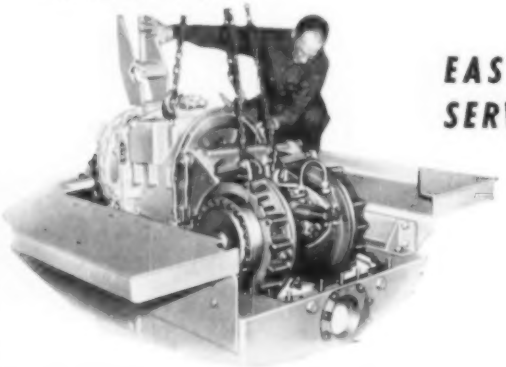

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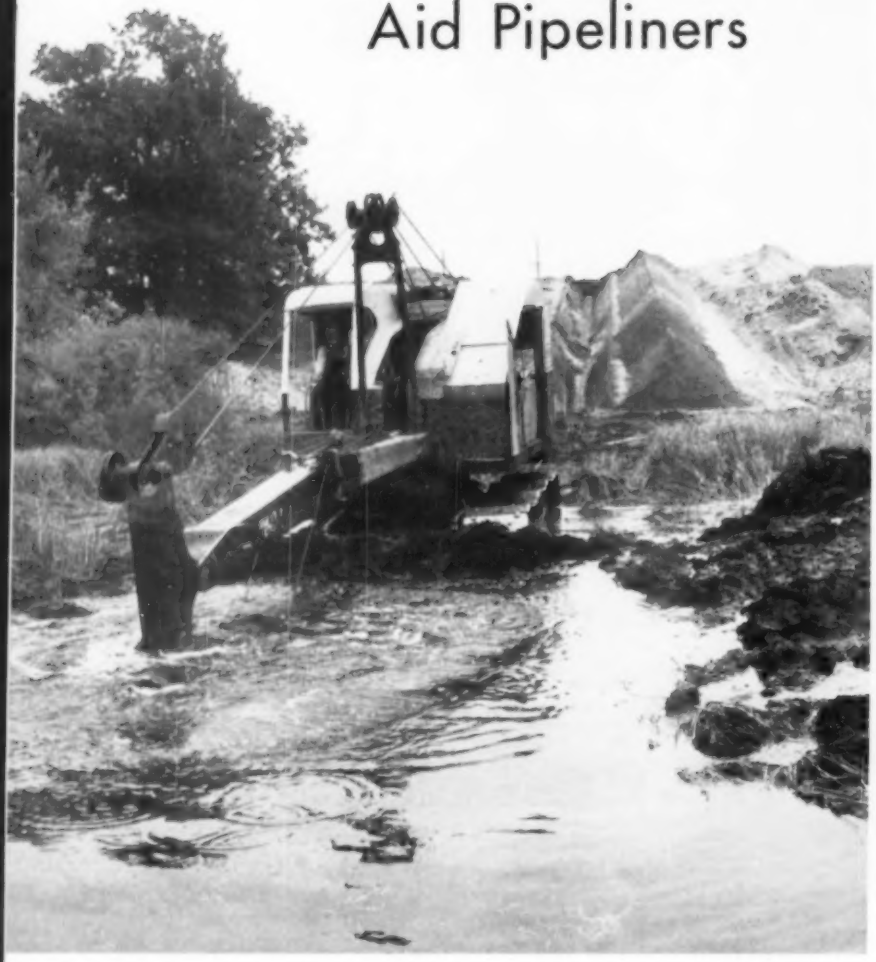


Helicopter, skin diver are called in as pipeliners battle Minnesota mucklands.

PIPELINERS are no longer strictly earth-bound creatures. They now work in the air and underwater as well as on the surface. Mastery of these new elements was demonstrated recently by Pipeline Welding & Construction Co., Oswego, Kan., when it laid a natural gas line through miles of Minnesota swamps and bogs.

Weighting the pipe in the swampy terrain was what created the time-consuming problem. To speed the job, a Sikorsky heavy-duty helicopter was called in to place the weights. When the weights were placed in deep water, a skin diver worked below the surface positioning them on the pipe.

How much time was saved with this "sky hook" method would be almost impossible to compute, according to Spread Superintendent Ira Sugg, but the savings were tremendous. The big "chopper" placed 3,000-lb. concrete weights on the line under several feet of water in cycles as short as three minutes. The time it would take to handle the same weights with cranes or sidebooms varies in each situation, but Sugg recalls that as much as four hours have been spent hauling a single weight from the nearest stockpile and placing it in position on the pipe. "The helicopter method is certainly superior to the usual methods in this kind of terrain," Sugg said.

(Left) Bucyrus-Erie 22-B hoe cuts pipeline trench through small bog. Draglines were used in larger swamp cuts. (Below) Skin diver unhooks weights in deep water.

Pipeline Welding and Construction was laying 60 miles of pipe for Northern Natural Gas Co., Omaha, Neb., to serve the far north side of Minneapolis, Minn., and northern suburbs including Elk River, Coon Rapids and Anoka. The line will be fed from a new 24-in. main being laid between the Twin Cities and Duluth. About 26 miles of the total were 20-in. pipe; the rest were 8 and 6-in. lines to serve the various communities. The P. W. & C. contract also called for 28 metering stations where local utility companies tapped into the new line. Most of the pipe-weighting problems were on the 20-in. line which was laid in swampland for about 6½ miles.

Much of the right-of-way crossed flat, low-lying peat acreage which is ideal truck farm soil. But water tables in this rich land were often only a foot or two below the surface. The 6-ft. deep ditch became a virtual canal as soon as it was dug. And, to make matters worse, the dark organic earth was too light to hold the buoyant pipe down. Clumps of peat could be seen actually floating in the water filled ditch.

To hold the line down, P. W. & C. lowering-in crews put 3,000 pounds of

(Right) Pilot J. W. Sharbrough gets a briefing before taking off to place weights. (Below) Cat D7 sideboom stockpiles 3,000-pound weights for helicopter.

weight every 12 feet on pipe with .281-in. thick wall, and every 18 feet on .375-in. thick pipe which was used in the swamps. Where the going was too mucky to place weights quickly with conventional equipment, the "whirly bird" was called in.

The big 'copter's assistance was especially helpful at several points where the trench crossed existing drainage ditches. Specifications called for 11½ feet of cover at these crossings to allow plenty of room for future dredging of drainage ditches. This meant a hole more than 20 feet wide at the top—with a spoil pile on one side and deep mud on the other. Welding crews were able to slog through the mire and skirt the hole, but after the pipe was lowered-in it was a long reach to place weights on it.

The heavy-duty Sikorsky shuttled back and forth from stockpile to pipeline dangling 1½-ton weights with apparent ease. A skin diver, equipped with underwater breathing apparatus, positioned the weights and unhooked them from the 'copter's hoist line. In cooler

(Above) Where footing is firm, Cat D7 sidebooms place weights to hold down buoyant pipe. (Below) Lorain L-26 with ¾-yd. Williams bucket bails peat cut for lowering-in.

(Below) MD7 pipelayer bends 50-ft. joint of pipe with bending shoe. A second MD7 holds pipe for stringer bead welders who are closely followed by hot pass welders.

weather, the diver donned fully-rubberized regalia before entering the murky waters.

Besides speeding up the weighting chore, the 'copter turned other equipment loose for work elsewhere. R. S. Perkins, president of P. W. & C. Co., was pleased with the helicopter's performance.

The concrete weights, manufactured by the Anchor Weight Co. near Pipeline Welding & Construction's headquarters at Lino Lake Minn., were hauled to the job on tandem flatbed trailers pulled by Ford F-800 tractors—the same rigs used to move the spread's heavy equipment. Ten of the 3,000 pounders or 20 of the 1,500-lb. weights made a load. Where the footing was good, the weights were placed with Caterpillar D7 sidebooms.

Weights were placed on top of the pipe, rather than bolting two halves above and below. Sugg declared that bolts underground will rust and eventually break leaving only the upper half of the original weight to hold down the pipe. With all the weight above the pipe, there is no danger of losing any weight later, he noted.

Operates Fleet

The Sikorsky S-58 was leased from Petroleum Helicopters, Inc., Lafayette, La., which operates a fleet of 51 helicopters throughout the United States, and in Canada and South America. The lifting power of the S-58 varies with altitude, atmospheric conditions and fuel load, but the craft is rated at 13,000 pounds gross weight and 7,630 pounds empty weight, providing a payload of well over 4,000 pounds. It cruises at 100 mph and can climb 1,000 feet in a minute. The S-58 is powered by a Wright Cyclone 989C9HE-2 engine. Lifts are made with a multi-purpose sling attached to the underside of the fuselage.

Passenger models of the S-58 carry 12 to 16 people and a two-man crew. Military versions are the Army H-34 and the Navy HSS. Petroleum Helicopters has long provided passenger and cargo helicopter service for offshore oil drilling rigs and has ferried supplies and personnel for oil and pipeline operations. The "sky hook" use of helicopters is new to the pipelining industry, but is well established in erection of electric power transmission towers in remote places.

One other advantage offered by the helicopter is that it goes quickly from one spot to another on the job under its own power, and faster than any other piece of equipment.

(Left) Sandy loam was easy digging for Cat-powered Cleveland model 320. (Right) A pair of D7 sidebooms hold pipe for tie-in.

The rest of the equipment in the P. W. & C. spread is more typical of a pipelining operation. Right-of-way was cleared by two D7's and a Ford tractor with Brush Hog attachment. Occasional large stumps were blasted.

Handling ditching chores were a No. 320 Cleveland trencher powered by a Cat D8800 diesel and a 140 Cleveland powered by an International Harvester UD-9. Digging a 48-in. deep trench for the 6-in. gas line, the larger Cleveland averaged 6,000 feet per 10-hr. day. Material encountered on the higher ground was sand and sandy loam. Occasional boulders were found but none required shooting. A well point system was used to dewater one cut where the 20-in. pipe had to go 12 feet deep to cross under an existing pipeline.

Use Five Hoes

In the extensive swamp cuts five hoes were used; three were Unit 120's; one was a Unit 640; and one, a Bucyrus-Erie 22-B. In the deeper cuts two draglines, a 22-B and a L-26 Lorain, were employed. Most of the work was done on mats. The two draglines were also used to ditch across the Rum River, the only river crossing on the job.

The pipe, manufactured by Youngstown Sheet & Tube Co., was cleaned, primed, coated and wrapped in a yard at White Bear Lake, Minn. Random joints of the 20-in. averaged 43 feet long; smaller pipe was handled in 50-ft. joints.

In addition to the usual exterior treatment, the pipe was given an interior coating with Copon, a product of Coast Paint & Lacquer Co., Houston, Tex. The paintlike substance was sprayed on, and it dried fast and hard providing a smooth interior surface to cut down friction and thus increase the amount of gas that can be delivered through the line. As a secondary benefit, the Copon will also retard corrosion. Internal coating, a process long familiar to water utility contractors, is new to oil and gas pipeliners.

Stringing on the job was subcontracted to Parkhill Trucking Co., Tulsa, Okla. Road boring was done by Horizontal Holes, Inc., Houston, Tex., with a Crose boring machine assisted by two International TD-14's with sidebooms and dozer blades.

Workhorses of the bending and welding crews were three Cat MD7 pipelayers. The 20-in. pipe was shaped by a Crutcher-Rolfs-Cummings (CRC) bending machine; smaller pipe was shaped over a bending shoe on a MD7. A D7 carried twin Lincoln 300-amp welders for stringer beads. Other Lincoln welders for hot-pass, filler and cap welds were truck-mounted. Including tie-in and utility equipment, the spread had five 300-amp, and ten 200-amp Lincoln welders.

Patching crews applied Pittsburgh Paint Co. dope to the welded ends and to areas where the wrapping was damaged. Final wrapping and inspection followed, and the welded pipe was left on skids for the lowering-in crew. Lowering-in equipment included International Harvester TD-15 and TD-18A sidebooms, two Caterpillar D7 sidebooms and two John Deere model 440 sidebooms.

Assigned to backfilling were an Allis-Chalmers HD-7 and Cat D6 and D7 dozers assisted by the draglines in some swamp cuts. An Oliver tractor with twin discs worked with clean-up crews. Other equipment in the P. W. & C. Co. spread included a fuel truck, a lube truck, two utility welding trucks, two Chevy Carryalls, two Willys Jeep buffing rigs and ten pickups.

Personnel Named

Foremen were Paul Gibbons, right-of-way; Tommy Newberry, ditch; Warren Mulkey, bending; Bill Terry, pipe; W. C. (Red) James, welding; Dale Meek, lowering-in; and John Newberry, clean-up. Ivan Steele was office manager. About 200 men were on the payroll in addition to those who worked in the coating and wrapping operation.

Chief inspector for Northern Natural Gas Co. was Gunder Fjalstad.

T. B. Perkins is secretary-treasurer of the pipeline company.

Trinity Dam Harnesses High Watershed

Here's how the dam, tunnels and powerhouses of one of California's largest current water-use projects fit into overall plan of the Central Valley system to supply water-deficient areas.

by Ray Day

THE battle isn't won. From northern California's high mountains 400 miles south to the arid wastelands of the parched San Joaquin Valley floor, California's century-old quest for water continues. Contractors are working on multi-purpose projects which some day, if integrated into a master plan, will be looked upon as one of the engineering marvels of the world.

Today, 45 miles west of Redding on the high-walled Trinity River, another major dam will soon become part of the great system known as California's Central Valley project. That dam-building contract totals $49 million. And yet that dam is only one part of the Trinity Divison, and the Trinity is only a small part of the CVP.

To understand fully what part Trinity dam and its appurtenant works play in the system, it is desirable first to evaluate CVP as a whole. To do so is to step back through the pages of history, years before the great population shift westward began, which today is pouring new residents into California. When men first began to evaluate California's water resources, there was more time for study than there is now.

History Rich In Imagination

California's Central Valley irrigation dates back to the 1850's when private parties first constructed canals to serve local areas near such rivers as the Sacramento, the Trinity and the Klamath. Efforts at developing a comprehensive plan for the Central Valley date back to 1873, when a board of commissioners prepared a report on irrigation in the San Joaquin, Tulare and Sacramento valleys.

The over-all plan for water development contained complete and comprehensive information. It was first defined in a report issued by the state of California in 1930, entitled *State Water Plan*. This plan envisaged the transfer of an over-abundant water supply from the northern part of the Sacramento Valley to the southern part of the San Joaquin Valley, where a deficiency existed then as it does today. The state plan proposed as the first-phase units toward the solution of this problem such works as Shasta dam, Delta Cross channel, Delta-Mendota Canal, Friant dam, Madera canal, the Friant-Kern canal, the Contra-Costa canal and a power transmission system.

Although there have been changes in some of the engineering designs, the initial units proposed in the state report are

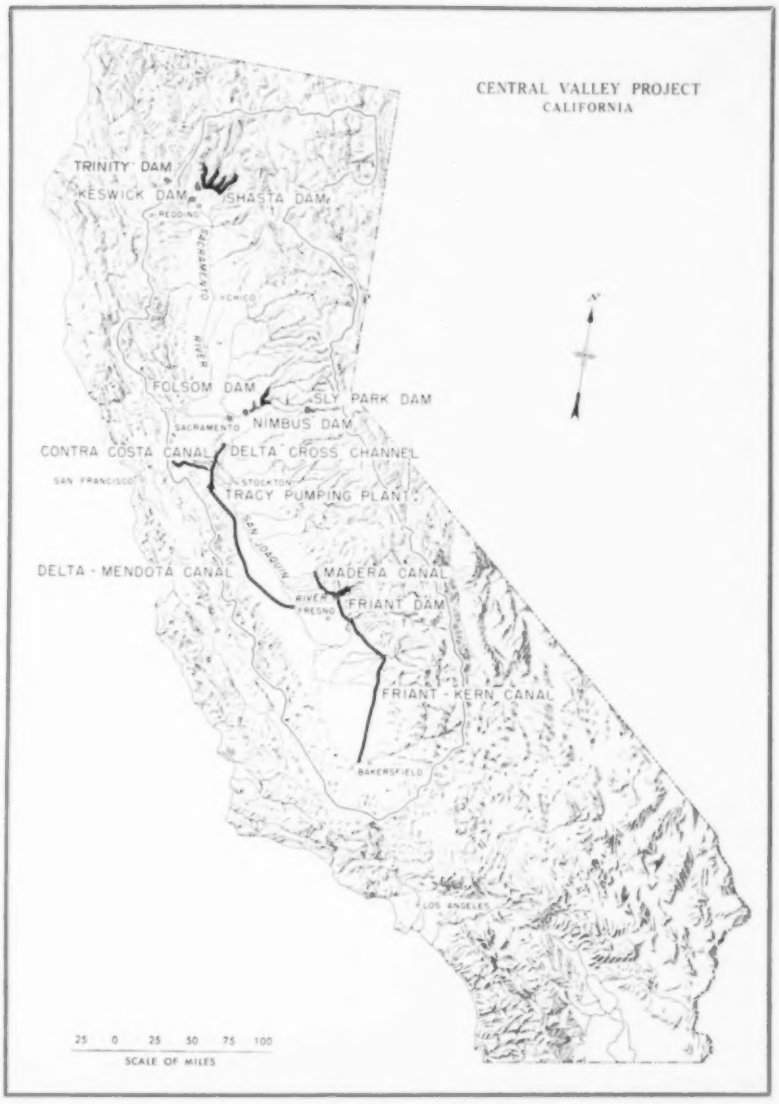
A reservoir of 2½ million acre-feet will be created by the 33 million yard earth-and-rock barrier of Trinity dam. A group of contractors, headed by Guy F. Atkinson Co., South San Francisco, Calif., will finish the $49 million structure this year.

essentially those which were authorized for construction under a reclamation law by Congress in 1937, and which have since been built by the U. S. Bureau of Reclamation under private contract. In addition to the units mentioned, Keswick dam was authorized and built to regulate the fluctuating power releases from Shasta dam and to add to the power capacity of the project. Also, in 1949, Congress authorized the construction of the American River unit, including Folsom dam and power plant, Nimbus dam and power plant, and the Sly Park Project for the support of the Central Valley project. All features of the project have been integrated into a unified operations system.

Construction of the first structures got under way actively in 1937 and played a vital roll in bolstering California's economy during the great depression, as well as that of the country at large. By August 1951, all the works comprising the initial project were in operation. Through these facilities the storage of surplus water in the extreme north of the project at Shasta dam made possible the delivery of an irrigation supply to thirsty acres in the vicinity of Bakersfield, nearly 500 air miles to the south. Despite this achievement, however, the southerly end of the valley needs much more water.

Taking an average year's return, consider what Central Valley Project did for California and the nation in 1956. In that year more than 2,600,000 acre-feet of water were delivered to the San Joaquin Valley. An adequate irrigation supply was delivered to more than 250,000 acres, and supplemental supplies were provided for more than 900,000 acres of land. These lands are among the most productive in the United States, contributing annually crop revenues of nearly $200 million. In addition, food and fiber-processing industries absorbing the crops raised on these farms provided employment to thousands, and contributed to generally high living standards in the nation.

During the same year, CVP power plants generated more than 3¼ billion kilowatt hours of electricity. Much of this power was used at project pumping plants. The remainder was absorbed by federal-government installations and by public and private agencies. Up to now, the federal government has invested in CVP a total of $589,302,000. Project revenues from water and power to the same date amounted to $146,943,000. These revenues have provided project



Trinity dam will be a major feature of the Bureau of Reclamation's Central Valley Project, joining well-known structures such as Shasta, Keswick, Folsom and Friant dams.

operation and maintenance, a reserve for replacement, interest on power and municipal water investments, and in addition have repaid into the United States Treasury $82,182,000 against the liquidation of project construction costs.

Additional Benefits

While the storage and delivery of irrigation water and the generation of electric power is the prime purpose of CVP, a number of other important things also result. These include vast improvements in recreational possibilities, a threefold increase in navigation on the Sacramento River, and a reduction of heavily-destructive floods from the former incidence of one in four years to a USBR-calculated rate of one in every 300 years.

The engineering works which now make up the project are impressive, but they form only the basic pattern for the installation as it will be in the future. The Trinity Division of CVP, now under construction, will operate to transport an average of 865,000 acre-feet of water from the Trinity River watershed into the Central Valley Project system each year. Trinity Division power facilities will have some 369,000 kilowatts of generating capacity—slightly more than at Hungry Horse dam in Montana. The Sacramento River canals which will be diverted from the river at a point

A good example of the recreation facilities made possible in many areas by the CVP is this boating dock near Shasta dam.

near Red Bluff were designed eventually to provide a firm irrigation supply to 205,000 acres in the north central Sacramento River Valley, much of which is now dry farmed.

And all of this is because of people. A westward migration of people is taking place in the United States, and California is absorbing the movement at the rate of more than 1,000 people a day. In Central Valley alone, population increased from 1,126,000 in 1940 to 2,025,000 in 1955. It's estimated that by 1975 the population of this region might well exceed three million. The ability of the area to absorb this population will depend upon water. Water must be made available in great amounts for irrigation, for domestic use and for a growing industrial needs.

Plan For Future

The U. S. Bureau of Reclamation of the Department of Interior is charged by law with the responsibility for locating and investigating water conservancy projects, and providing for their development, if economically feasible. In cooperation with other federal and state water resource agencies and with local interests concerned, the Bureau has assembled into specific reports the technical data on major and minor potential projects which will at some future date be required to supply all the water needs of the valley.

Principal among its considerations are several possible additions which are calculated to stabilize water supplies in areas where groundwater overdrafts, over-cultivation or other causes have produced near-drought conditions. These additions include Auburn dam which would provide an added measure of control in the American River system, and the Folsom north and south canals to convey American River water from existing control works into adjacent irrigation areas. Important, also, is the proposed San Luis system, consisting of a reservoir and a canal some 100 miles long which would provide an urgently needed irrigation supply to lands on the west side of the San Joaquin Valley. Here, gravity systems and deep-well pumping have proved disastrously inadequate.

The need is urgent. Requests for water totaling approximately 1,500,000 acre-feet have been received from organized districts in the east side of the San Joaquin Valley, which extends from the Sierra Nevada foothills to the trough of the valley and covers 3,500,000 acres.

The structural features of CVP make up one of the most extensive artificial water transport systems in the history of the world. These elements include the structures authorized for construction by Congress in the Central Valley Project Act of 1937, plus those in the American River Basin which were integrated into the project at a later date.

Extending through the length of the great Central Valley, these works include three major storage and two regulatory dams, four power plants, one major and a number of lesser pumping plants—all connected by trunk-line canals and a power transmission system. The project's primary task is to provide the means for transferring water from the Sacramento River Basin where surplus exists into the water-deficient areas of the San Joaquin Valley hundreds of miles to the south.

Shasta dam and reservoir are located on the Sacramento River below its confluence with the Pit River a few miles north of Redding in the far northern section of the project area. They store and regulate water in its areas of origin. Shasta dam is a concrete structure 602 feet high, with a crest length of ⅔ of a mile and a reservoir of 4½ million acre-feet. Shasta's power plant is California's largest hydroelectric installation, operating five generators of 75,000 kilowatts capacity each. Over its spillway floodwater drops 480 feet, nearly three times the height of Niagara Falls.

Smaller Dam

A few miles downstream from this key structure is located Keswick dam, a much smaller installation which re-regulates and balances the water released from Shasta. The power plant at Keswick dam is equipped with three generators of 25,000 kilowatts capacity each.

After water has been released through Shasta and Keswick, it flows down the natural channel of the Sacramento River toward the delta area. As the American River flows into the main stream at the city of Sacramento, an additional regulated water supply is introduced into the project system through the American River facilities, consisting of Folsom and Nimbus dams.

Folsom dam is a concrete structure

Continued on page 33

CATERPILLAR REPORTS:

THE BIG STORY BEHIND THE BIGGEST EARTHMOVING JOB IN MICHIGAN...

Holloway Construction Company depends 6,000,000 cu. yd. in 16 months on

Michigan contractor's giant highway spread is 95% Caterpillar!

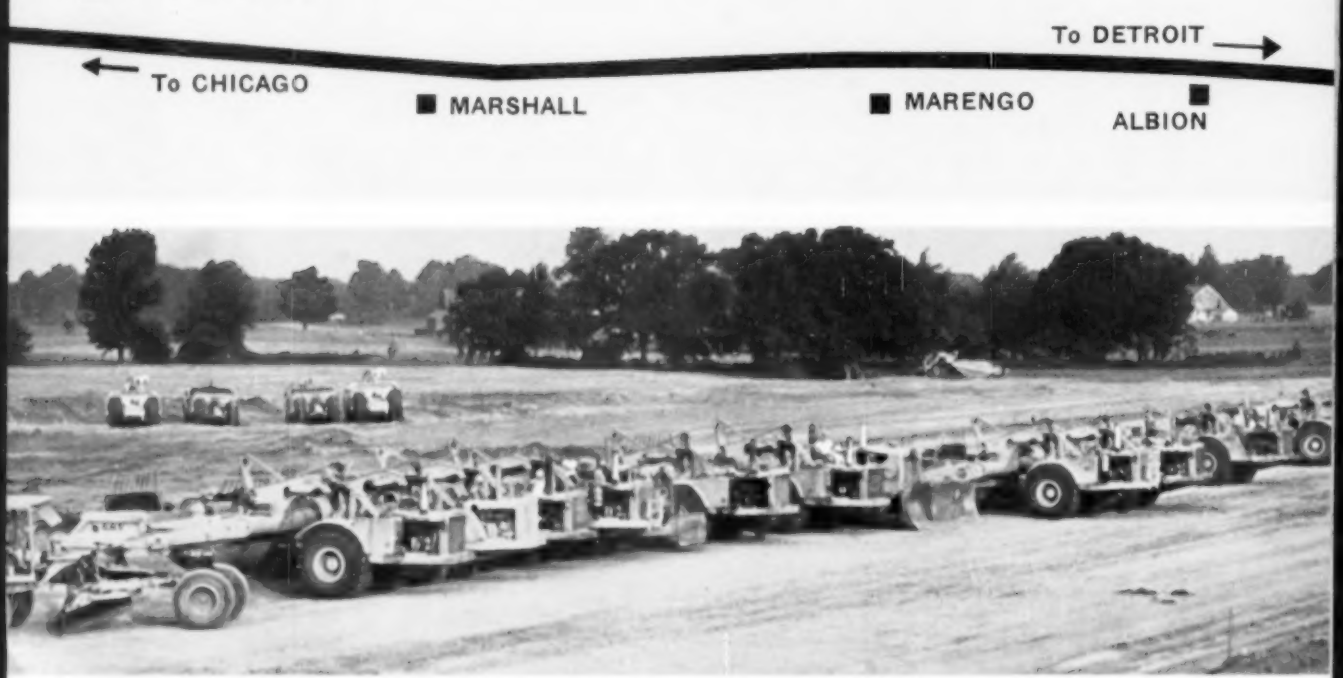
From Albion to Battle Creek, 6,000,000 cu. yd. of sand, clay and muck are being moved to speed traffic over the rugged hills of south central Michigan. In the largest earthmoving job ever handled by a single contractor in the state, curving U. S. 12 is being converted into 21 miles of Interstate 94.

Midway between these two cities you can stand with your feet planted deep in the soft, brown clay and look in either direction, as far as the eye can see, at the army of yellow Caterpillar machines carving out the path of this new roadway.

The Holloway Construction Co. of Livonia, Michigan, won the $8,500,000 contract by being low bidder on three continuous segments of the project. Work started on April 1, 1959, and is due for completion by August 3, 1960. As of the latest report, according to Bud Morrell, Job Supt., production was running 10 months ahead of schedule.

To keep pace with the demanding schedule, men and equipment are working a steady 11 hours every day. And the Holloway spread—twice as large as any other assembled by one contractor in the state—depends heavily on Caterpillar quality to maintain this high-production capacity.

NEW INTERSTATE HIGHWAY No. 94
Calhoun County, Michigan



Part of the Holloway Construction Company's massive equipment spread that is now working on Michigan's biggest earthmoving job. 95% of the machines are Caterpillar-built, assuring the dependability needed to keep the job on schedule. When work is completed, Interstate No. 94 will be one of the key routes between Detroit and Chicago.

on Caterpillar machines in moving 21-mile Interstate Highway project

There are 66 Caterpillar-built machines operating on the job including:

40 DW21 Tractor-Scrapers

8 D9 Tractors	**2 D4 Tractors**
8 D8 Tractors	**4 No. 12 Motor Graders**
2 D6 Tractors	**2 No. 14 Motor Graders**

For successful contractors throughout the country like Dan Holloway, there is only one reason for using Caterpillar equipment: "I think Caterpillar is the best equipment made in terms of high production and low cost of operation."

This, indeed, is the big story behind Michigan's biggest earthmoving job.

Gamma Rays speed soil compaction tests. This new device, developed by the Michigan Highway Department, determines compaction as well as moisture content. In two minutes it can perform work which takes a half hour by conventional methods.

High-speed loading of DW21s with Cat D8 and D9 pushers is clearly visible in a borrow pit several miles north of Marshall, Michigan, one of the towns to be bypassed by the new highway.

WHAT THE MEN WHO KNOW MACHINES HAVE TO SAY ABOUT CATERPILLAR-BUILT EQUIPMENT:

Francis "Bud" Morrell, Job Supt., Holloway Construction Co. "You can count on Caterpillar. When you take a big job, you must be sure that your equipment is going to stay on that job. We take care of our machines, work them like hell, and know that these Caterpillar machines take good care of us."

George Neely, Equipment Supt., Holloway Construction Co. "We like Caterpillar machines because they are better than any other make. We've tried them all at one time or another, but these other manufacturers have a long way to go before we change our minds on which equipment is the best."

Dan Holloway, Owner, Holloway Construction Co. "Caterpillar machines make more money for us. They stand up under 12-month-per-year punishment. Last December we moved one million yards of dirt in 28 days. We had to keep after it day after day to prevent it from freezing."

Russ Hill, Master Mechanic, Holloway Construction Co. "When a machine goes down, you have to move fast to get it back on the job. We want the right part fast. Michigan Tractor (Caterpillar Dealer) takes good care of us. When a part is guaranteed, you know they'll back it up."

NEW PRODUCTS FROM CATERPILLAR SET NEW PRODUCTION STANDARDS

Here's a review of 3 important product developments born of Caterpillar research . . . proved in the field . . . available to you now for higher production

New 225 HP Cat No. 619 Tractor and 14 cu. yd. No. 442 Scraper

First two-wheel tractor to deliver four-wheel speed and dependability . . . matched with new No. 442 Series B LOWBOWL Scraper for new high production. The new No. 619 with Turbocharged Cat Engine provides 225 HP and high torque rise, ideal for lugging under load and fast acceleration. Its LOWBOWL Scraper handles 14 cu. yd. struck, 18 cu. yd. heaped. It has a 30.2 MPH operating speed, plus ground-hugging roadability never before found in a two-wheel tractor of comparable size. It is a versatile "all job" rig.

SynchroTouch Transmission Control for DW20 and DW21 Tractors

An advanced new way to shift gears easier and faster. Operator simply dials desired gear for automatic, split-second, touch-and-go response! In less than a second, it is engaged. Standard foot clutch is retained but is used only starting from standstill.

Optional for DW20 and DW21 Tractors, the Caterpillar SynchroTouch Transmission Control gives you these important benefits: 1. Faster shifting—for faster cycles and more payloads per hour. 2. Significant reduction in operator fatigue. 3. Economical direct drive transmission—uses standard DW20 and DW21 transmission and clutch components. 4. No special maintenance.

Power Shift Transmission for D8 and D9 Tractors

On-the-go shifts under full load in a split second. Changes speed, reverses direction with finger-tip control lever—and no clutching! This new transmission, with exclusive new design, provides production highs never before possible with a track-type tractor.

Power shift control is mounted to operator's left. Selector lever (black knob) eliminates gearshift, forward-reverse and flywheel clutch levers. Safety lever (red knob) prevents accidental engagement. Selector lever moves in a "U" path to various positions.

See your Caterpillar Dealer for the complete facts. Ask him to demonstrate these new product developments on your job.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

CATERPILLAR

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DIESEL ENGINES • TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

GREAT NEW PRODUCTS IN THE CATERPILLAR TRADITION

TRINITY RIVER DIVISION

Central Valley . . .

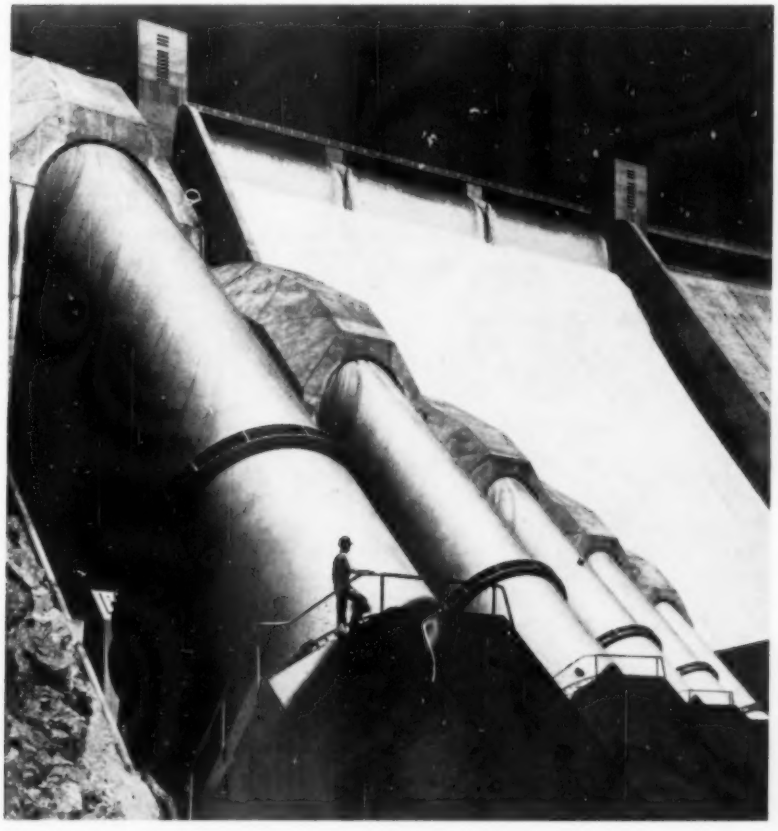
Continued from page 28

340 feet high and 1,400 feet long, with two earthfilled wing dams and a number of dikes completing the storage installation. The reservoir has a capacity of a million acre-feet. Folsom power plant houses three generators of 54,000 kilowatts each. Re-regulation for major water releases from Folsom is provided at Nimbus, its afterbay complementing structure. The Nimbus power plant contributes 6,750 kilowatts from each of two generators. The Sly Park Project consists of a diversion dam, a storage reservoir and a conduit supplying water to some 10,700 acres in El Dorado county.

Heart of CVP is Shasta dam and powerhouse, completed in 1945. Dam is 602 feet high, two-thirds of a mile long and impounds a reservoir of 4½ million acre-feet.

Tap River Flow

Some 30 miles downstream below Sacramento, the Delta Cross channel provides for the regulated passage of Sacramento River water through the delta channels to the Tracy pumping plant. During this passage a portion of the water is used to stem the inflow of salt water from the Pacific Ocean into the delta, and an additional portion is taken into the Contra Costa canal. This canal has its intake near the town of Oakley and carries the water westward a distance of 48 miles. Four pumping plants lift the water 124 feet above the sea-level intake of the canal. The Contra Costa canal supplies water to 22,000 acres of agricultural land, is a source of industrial water for manufacturing plants on the south side of Suisun Bay, and provides domestic water to cities in the area.



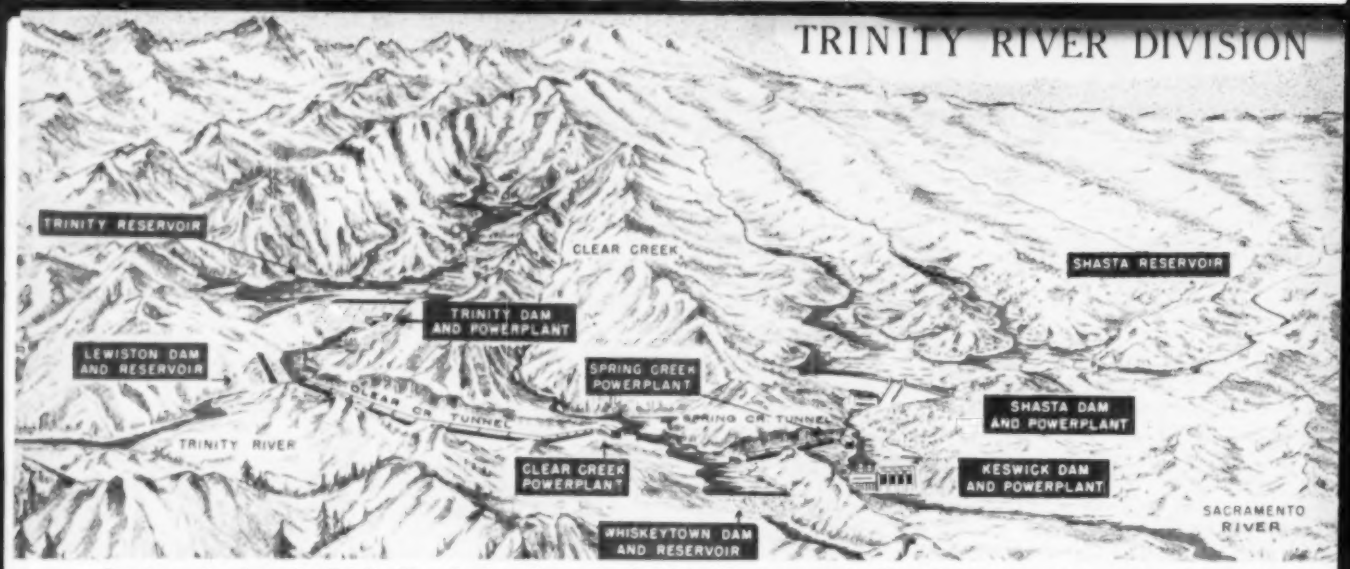
Man is dwarfed by his works. A technician of the Bureau of Reclamation looks tiny compared to Shasta's penstocks.

Pumps Lift Water

After traversing the delta, the water arrives at the Tracy pumping plant, which is its introduction to the San Joaquin Valley. Here six 84-in. centrifugal pumps, each with a capacity of about 340,000 gallons per minute, lift the water 196 feet above sea level and discharge it into the Delta-Mendota canal where it begins its journey southward. The Delta-Mendota canal, with an initial capacity of 4,600 cfs, skirts the San Joaquin Valley through its western foothills for a distance of 120 miles to discharge its water cargo into the San Joaquin River at Mendota.

Entering the San Joaquin at the Mendota pool, water originating in the Sacramento River Basin and transported from it by man-made means, replaces the natural flow of the San Joaquin River, which is diverted at Friant dam about 20 miles northeast of Fresno.

At Friant dam, almost the entire flow



Surplus water from the Trinity River basin will be diverted into the Sacramento River Valley through a series of tunnels.

of the San Joaquin River is turned southward into the Friant-Kern canal and northward into the Madera Canal. Friant dam is 320 feet high and has a crest length of 3,430 feet. The reservoir in Millerton Lake has a capacity of 520,000 acre-feet. The Madera canal, which flows northward from its source at Friant dam, is 37 miles long; it has a capacity of 1,000 second-feet.

From Friant dam southward for a distance of 153 miles, the Friant-Kern canal with an initial capacity of 4,000 second-feet carries a life-giving supply of water into the major water-deficient areas of the project.

In delivering water to the farmer-consumer, the Bureau of Reclamation operates through some 70 irrigation districts which receive supplies direct from the several main-line project canals. These districts are autonomous state political subdivisions. They operate and maintain their own distribution systems. Many districts owned distribution systems prior to construction of the project, while for others the Bureau constructed distribution systems under contract. These works, like the main project facilities, are, insofar as the irrigation aspect is concerned, financed under non-interest bearing terms.

One-third of the electric energy output of Shasta power plant is transmitted for use to the Tracy pumping plant for its operation, and to smaller project pumping plants on the Contra Costa and other canals. The remainder is sold to cities, irrigation districts and to other agencies. Revenues from power sales will absorb about 60% of the repayable costs of the project. Without these financial returns, the project would probably be unable to furnish water for irrigation use at a cost within the capacity of the farmer-users to pay.

The Trinity River Division, now under construction, is a major feature of CVP. Basically it calls for surplus water from the Trinity River Basin to be stored, regulated and diverted through a system of dams, reservoirs, power plants, tunnels and conduits into water-deficient areas of the Central Valley Basin. These are located in Trinity and Shasta counties. At the place where Trinity dam is being built, their elevation is 1,500 feet above and 20 miles west of the Upper Sacramento Valley.

Divert Surplus Water

The basic plan calls for Trinity River water to be stored in the 2,500,000 acre-foot Trinity reservoir behind Trinity dam. Releases from this reservoir will pass through a 96,000-kw power plant, and will then be re-regulated in Lewiston reservoir about seven miles downstream. Lewiston dam will contain outlets to release adequate water which will meet the downstream requirements of the Trinity River basin, including those of the Trinity River fishery. Water not needed in the Trinity River Basin will be diverted through Clear Creek tunnel to a 130,000-kw power plant at Clear Creek, and thence into the 250,000 acre-foot Whiskeytown reservoir on Clear Creek, a tributary of the Sacramento River. From this point, the water from Trinity River and surplus flows from Clear Creek will flow through the Spring Creek Tunnel to the Spring Creek power plant into Keswick reservoir on the Sacramento River.

By proper distribution of the Trinity Division water supply usable for irrigation and making maximum use of return flows and available surplus flows, a yield of 1,422,000 acre-feet per year can be provided to serve the ultimate requirements in the Sacramento canal's unit, lands in the Delta-Mendota canal service area, Shasta county, and other areas of the Central Valley project.

Main features of the Trinity River Division project, along with their vital statistics, are as follows:

TRINITY DAM

Type: Earth, sand, gravel and cobble fill
Height above streambed: 465 feet
Crest elevation: 2,395 feet above msl
Crest length: 2,440 feet
Volume of embankment: 33,180,000 yards
Spillway: 20-ft. diameter
Spillway capacity: 24,000 cfs
Outlet works capacity: 4,970 cfs

TRINITY RESERVOIR

Gross storage capacity: 2,500,000 acre-feet
Active storage capacity: 2,160,000 acre-feet
Inactive storage capacity: 340,000 acre-feet

TRINITY POWER PLANT

Number of units: 2
Capacity of units: 48,000 kw each
Turbine ratings: 66,800 hp each
Design head: 375 feet
Discharge per turbine: 1,850 cfs

Lewiston dam will be an afterbay structure built to re-regulate the releases from Trinity River reservoir to divert surplus water into the Clear Creek tunnel and to control releases for fishery and other requirements downstream. It is estimated that bids will be called for this portion of the work within the next two years. Statistics are as follows:

LEWISTON DAM

Type: Earth, rock and gravel fill
Height above streambed: 70 feet
Crest elevation: 1,910 feet
Crest length (including spillway): 715 feet
Volume of embankment: 320,000 cu. yds.
Spillway capacity: 31,000 cfs
Outlet works capacity: 210 cfs

LEWISTON RESERVOIR

Gross storage capacity: 14,600 acre-feet
Active storage capacity: 2,600 acre-feet
Inactive storage capacity: 12,000 acre-feet

The intake structure for Clear Creek

tunnel is to be located in Lewiston reservoir. The tunnel is being constructed about 11 miles southeasterly to Whiskeytown reservoir on Clear Creek. At the time *Excavating Engineer* visited the project, it was practically holed through, and much of the concrete lining had been constructed. Statistics relating to Clear Creek tunnel are as follows:

CLEAR CREEK TUNNEL
Length: 10.8 miles
Diameter: 17½ feet
Maximum flow: 3,200 cfs
Effective flow: 2,900 cfs

CLEAR CREEK POWER PLANT
Number of units: 2
Capacity of units: 65,000 kw each
Turbine ratings: 89,000 hp each
Design head: 561 feet
Discharge per turbine: 1,600 cfs

Whiskeytown dam is to be constructed also within the next two years on Clear Creek, approximately 2½ miles southeast of the village of Whiskeytown. The dam will re-regulate flows discharged from the Clear Creek power plant and the runoff from the Clear Creek drainage area. Statistics on the dam are as follows:

WHISKEYTOWN DAM
Type: Earth and rock fill
Height above streambed: 278 feet
Crest elevation: 1,228 feet
Crest length: 2,150 feet
Volume of embankment: 4,143,000 yards
Spillway capacity: 30,250 cfs
Outlet works capacity: 260 cfs at El. 1100

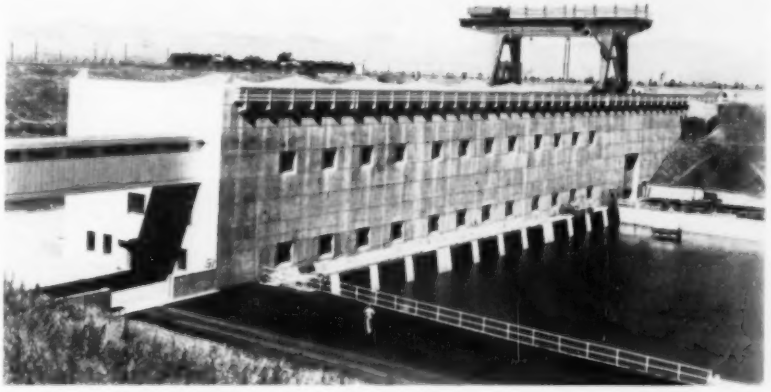
WHISKEYTOWN RESERVOIR
Gross storage capacity: 250,000 acre-feet
Active storage capacity: 217,000 acre-feet
Inactive storage capacity: 33,000 acre-feet

The location of Spring Creek tunnel's intake will be in Whiskeytown reservoir. The tunnel will be constructed about three miles easterly to the Spring Creek power plant and will connect with the 700-ft. tailrace tunnel leading into Keswick reservoir, the foot of the system. Statistics for Spring Creek tunnel are as follows:

SPRING CREEK TUNNEL
Length: 2.9 miles
Diameter: 18 feet 6 inches
Maximum flow: 3,600 cfs

SPRING CREEK POWER PLANT
Number of units: 2
Capacity of units: 71,500 kw each
Turbine ratings: 98,700 hp each
Design head: 569 feet
Discharge per turbine: 1,800 cfs

Directing the engineering features of the project which now are being fulfilled at Trinity dam, Clear Creek tunnel and other locations by roaring construction machinery, are some of the U. S. Bureau of Reclamation's top engineers. These include Regional Director B. P. Bellport, whose Sacramento headquarters has over-all charge of the project. L. B. Ackerman is project construction engineer, assisted by H. E. McInnis. Gil Drake is office engineer.



(Above) Shasta's hydroelectric plant is California's largest. (Below) Kilowatts from Shasta help run giant pumps at Tracy pumping plant that lift water into canals.

Concrete-lined Delta-Mendota canal brings water from the Tracy pumping plant near Sacramento to Mendota in the upper end of Kern county—a distance of 120 miles.

IT'S BEEN SAID

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"... five times the footage as the blast hole drills previously used."

"... always ready when we need it."

"... cuts drilling costs 50 percent."

And it all adds up to this:

No other blast hole drill offers the dependable, low-cost footage that owners consistently get from Bucyrus-Erie rotaries. That's why they are mining's most wanted rigs — by *far*.

Let your Bucyrus-Erie distributor show you the 40-R (diesel or electric, 6¾ to 9-in. holes) or the 50-R (full electric, 9⅞ to 12¼-in. holes). For full details, write Bucyrus-Erie Company, Drill Division, Richmond, Ind., 9B59.

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EX-Laffs WELCOMES the NEW YEAR!
BY Marven TOWNSEND
THE MEN ARE HAVING A GREAT TIME WITH THAT MISTLE TOE LEFT OVER FROM CHRISTMAS.
EXCAVATING ENGINEER
WOW! THAT MUST HAVE BEEN SOME PARTY FRED WAS ON.
WELL, WELL! CAN THIS BE THE SAME GAY, MAD, DANCING FOOL WITH THE LAMP SHADE ON HIS HEAD WHO WAS THE LIFE OF THE PARTY LAST NIGHT?
LOADING AREA
I UNDERSTAND YOU DID A VERY FUNNY IMITATION OF ME AT THE EMPLOYEES NEW YEAR'S PARTY. I HOPE YOU'LL BE AS GOOD IMITATING YOUR NEXT BOSS!

Caterpillar Releases Seismic Analysis Data

A simple geophysical technique is helping the earthmoving industry eliminate some of the guesswork in bidding earthmoving jobs, by determining the rippability of subsurface rock.

This roundup story explains how contractors are using seismic analysis in bidding and equipment scheduling, the scope of its use, where the seismograph may be purchased and the testing procedures. A new table correlates D9 tractor-ripper performance with seismic wave velocities. A previous article about this subject, *Shock-Wave Technique Reveals Subsurface Conditions*, appeared in the June 1959 issue of *Excavating Engineer*.

NOT many years ago blasting was the only practical way to move hard or rocky materials. Development of powerful crawler tractors during recent years has changed this picture, paving the way for application of rippers for shattering and loosening tough materials to speed scraper loading. As contractors gained experience with this new tool, they tackled harder materials to see if it would work.

Contractors learned that any material could be ripped, if conditions were right. The key to rippability seemed to be consolidation of the material. With no economical way to determine this factor, all they could do was try. But how many contractors could afford to invest in a $55,000 machine on the chance that it might work?

Engineers of Caterpillar Tractor Co., Peoria, Ill., tackled this problem, looking for a fast, inexpensive and accurate way to determine if the material could be ripped—before a tractor-ripper was moved in. Now, backed by more than 500 tests throughout the country, Caterpillar has developed the seismic analysis method to determine rippability.

Seismic analysis offers the desired features. It is simple in theory—sound waves travel through materials of different consolidations at different, predictable velocities. The velocity of the sound or shock wave through the subsurface material provides the answer to "can it be ripped?"

The equipment is lightweight, simple to operate and accurate. It includes a source of the sound or shock wave (an 8-lb. sledge will do fine) and a receiver (a standard geophone) and an electronic counter. It all weighs about 40 pounds, and can be carried easily by two men.

Learn Quickly

Contractors' personnel can learn to operate this equipment in less than an hour, following directions furnished by the manufacturer, Geophysical Specialties Co., Hopkins, Minn. (The seismograph, including self-contained batteries, costs less than $3,000.) Working with the equipment for a day or two under known conditions will quickly develop reliable accuracy of operation.

Operating procedure is simple. The electronic counter, housed in a small metal container about the size of an overnight case, operates on self-contained batteries. A geophone plugs into one receptacle on the counter's face. A long wire goes into another receptacle and the other end of the wire connects to a spring contact switch on the sledge. A small steel plate, when hit by the sledge, will produce a sufficiently strong wave for readings to 50 feet deep under most soil conditions. Blasting caps wrapped in a couple feet of primacord may be used if stronger waves are needed.

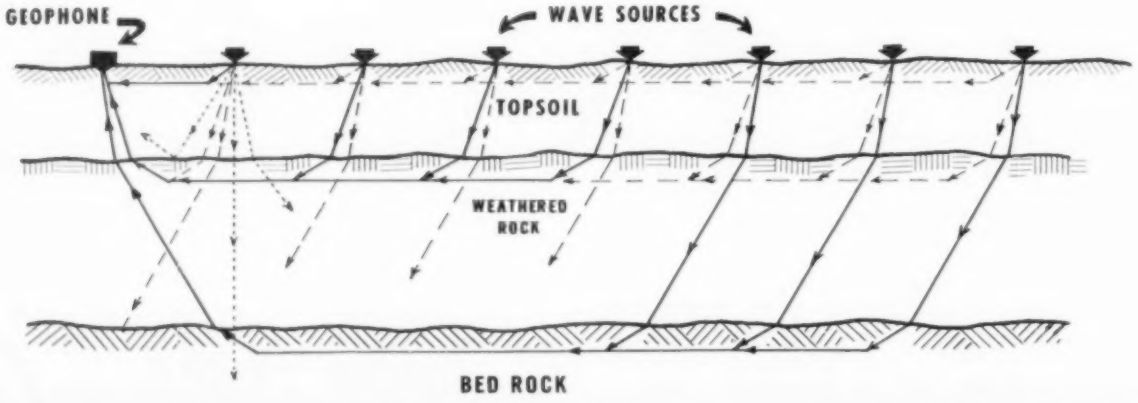
When the sledge strikes the plate, shock waves are sent through the ground and the switch closes, starting the counter. When the first wave reaches the counter through the geophone, it stops the counter. Time is recorded in milliseconds by flashing lights. The first check is made at 5 or 10 feet from the geophone, and successive checks in a line from the geophone in 5 or 10-ft. steps, depending on soil and job conditions.

A complete test on a cut can be run in less than 30 minutes. Velocity (V) of the wave is found by this formula:

$$V = \frac{D}{T}$$

The letter D is the distance from the plate to the geophone and T is the time

Figure 1. Operation of the seismic equipment can be seen in this diagram. Seismic waves are created at the arrows, starting at a point 10 feet from the geophone and moving out 10 feet at a time to 100 feet. At 10 feet, the wave near the surface is the first to reach the geophone. From 20 to 40 feet, the wave traveling through the denser weathered rock reaches the geophone before the waves traveling through the less dense topsoil or the deeper bed rock. Beyond 40 feet, the waves traveling through the bed rock are the first to reach the geophone. Although these waves travel farther, they move faster.



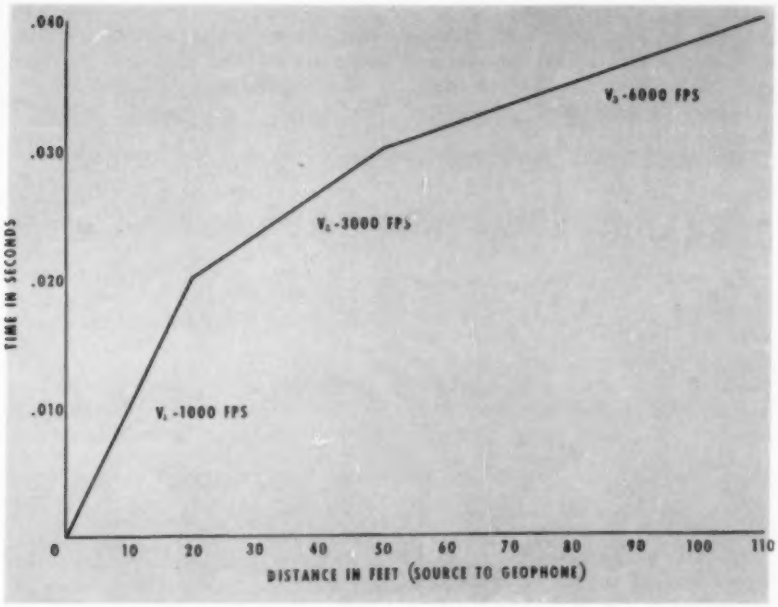


Figure 2. To interpret geophone findings, the time and distance are plotted on a graph, with distance in feet plotted along the bottom and time in units of milliseconds plotted up the side. Points fall in line for each type of material encountered since shock wave velocities are the same for material of similar consolidation. Straight lines drawn through adjacent points in this graph show three types of material.

lapse. This is plotted on a graph, with distance in feet along the bottom and time in milliseconds up the side. Points fall in line for each type of material since velocities are the same for similar consolidations. Intersection of straight lines through adjacent points indicates changes in consolidation.

Depth at which these changes occur is computed by the following formula:

$$D = \frac{X}{2}\sqrt{\frac{V_2 - V_1}{V_2 + V_1}}$$

Here D is depth; X is the distance along the bottom of the graph from zero to the intersection point of the lines; V_1 is the velocity of the seismic wave in the upper layer; and V_2 is the velocity in the next lower layer. Depths of successive layers are determined in similar fashion.

Accuracy has been established by running tests under known conditions and by checking ripper performance after tests. Caterpillar Tractor Co. and many of its dealers have this equipment and conduct tests for contractors after highway jobs have been awarded. More than 50 contractors own this equipment, using it to determine subsurface conditions before bidding and equipment scheduling.

On one highway project in Michigan's upper peninsula and another in the hills of southeastern Kentucky, contractors were planning to drill and blast. Seismic analysis showed large quantities of the rock could be ripped and handled by scrapers, at considerable reduction in cost per yard. Both contractors moved in two Cat D9 tractors with mounted rippers, based on these findings.

The large number of tests have been amassed into a set of tables. Rippable and non-rippable velocities have been determined for each type of soil. In almost every case, a zone of marginal material divides these two categories. Rippability within this zone depends on soil conditions, machine condition and skill of the operator. Consequently each contractor must determine rippability within this zone. Many times he can almost completely eliminate it through experience.

Satisfactory results cannot be obtained when the surface is frozen. This ground is so consolidated that the surface wave almost always reaches the counter ahead of the subsurface wave, regardless of the density of these lower layers. Likewise, seismic analysis will not reveal the presence of softer materials below harder layers, such as in cap rock areas.

Ripping is not considered a cure-all to every rock-handling problem. A contractor must weigh many considerations in deciding what method to use for a particular case. Factors are the type of equipment already on the job, availability of special tools, proximity of structures and populated areas, acceptable production rates, local regulations, relative costs per yard and insurance rates.

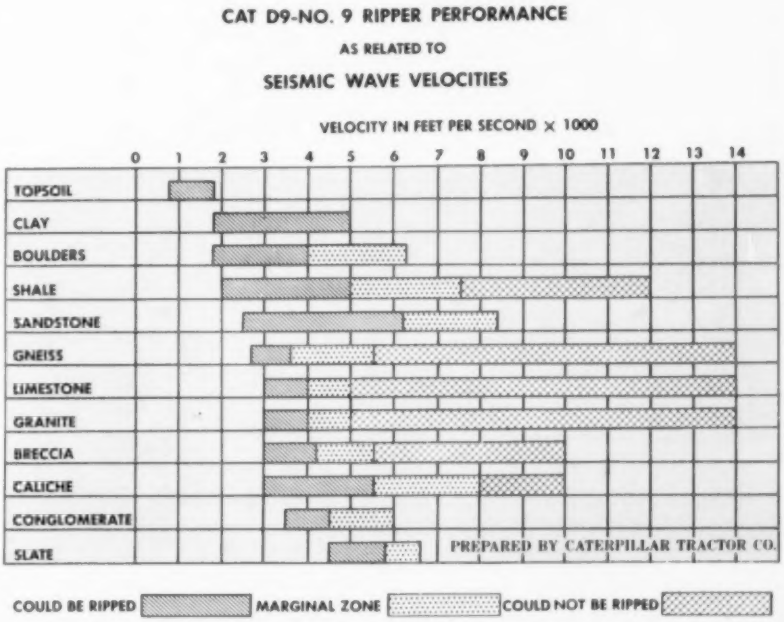


Figure 3. To determine if a subsurface material is rippable, Caterpillar engineers have compiled tables such as this on 12 common materials. The breakover point on wave velocity between rippable and non-rippable material varies for each type.

NOT in the Contract

In applying for his pension, Grandpa Tolliver couldn't rightly say how old he was because he can't count that high. But he told the clerk that he had the 7-year itch nine times. The clerk figured he was at least 60 and told him he was a sexagenarian. "Yer darn tootin," snapped grandpa proudly. "My wife had triplets this spring."

First passenger: "I'm quite a literary man, you know. I've contributed to the Atlantic Monthly."

Second passenger (leaning over the rail): "Know what? I've contributed to the Atlantic daily."

The story of a sad-faced fellow so touched the merchant's heart that he filled a large sack with groceries and said, "These are on me—hope they help."

Misty-eyed, the fellow started out, then turned back.

"Need something else?" asked the merchant.

Came the sad reply, "How about my trading stamps?"

Dad: "Daughter, while you were out, some chap named Charlie called, and asked for 'Hot Lips'. . . . Later a guy named Len, then one named Albert, and finally a fellow named Arnold phoned and they too, wanted to speak to 'Hot Lips'. . . . Daughter I'm afraid I must ask you a very serious question."

Gal: "Yes, Dad."

Dad: "Have you been smoking?"

A local employer had the following legend printed on its salary receipt forms:

"Your salary is your personal business, and should not be discussed with anyone."

The new employee, in signing his receipt added: "I won't mention it to anybody. I'm just as ashamed of it as you are!"

"I got the idea from the sign next door."

Office manager: "I'll tell you why that sweater is not suitable for office wear—in the first place it's too tight, and it's too tight in the second place."

The parking lot owner called the three attendants together.

Owner: "Look, boys, we haven't had a single dented fender complaint all week."

He paused to let his words sink in.

Owner: "Now tell me, how can we make money leaving that much space?"

Shoulders thrown back proudly, the old mountaineer strode from the village post office when the letter had been read to him.

Outside, he made his way immediately to a gathering of his cronies in the chinaberry's shade.

"My boy, Eph," he announced so that all could hear, "has got his sentence cut down to six months for behavin' good."

There was quick interest. A grizzled hillbilly raised himself on an elbow.

"Hit's mighty nice," he commented, "to have a boy that does you sech credit."

A Martian landed and, while the tubes in his head glowed off and on in colored hues, he wandered into a bar. He noticed a man slipping a coin into the jukebox and was fascinated by the lights and colors of the machine.

He ambled over to the jukebox, stared at it for a moment and asked: "Now tell me, what is a nice girl like you doing in a joint like this?"

"Something the matter?" asked the bartender of the young, well-dressed customer who sat staring sullenly into his drink.

"Two months ago my grandfather died and left me $85,000," said the man.

"That doesn't sound like anything to be upset about," said the bartender, polishing a glass. "It should happen to me."

"Yeah," said the sour young man, "but last month an uncle on my mother's side passed away. He left me $150,000."

"So why are you sitting there looking so unhappy?" asked the bartender.

"This month—so far—not a cent."

An Alaskan who was getting tired of hearing a Texan complain about his state now being only the second largest said, "If you don't keep quiet, we'll split it in half and then you'll be number 3."

Special report to owners of Traxcavators, D6 and D4 Tractors

CAT CATERPILLAR

Parts you can trust
Dependable round-the-clock service

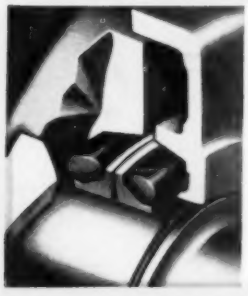
Now available...lifetime lubricated rollers...two-way savings...

ELIMINATE MAINTENANCE GIVE LONGER LIFE

Here's another cost-cutting improvement for Traxcavators and both D6 and D4 Tractors . . . lifetime lubricated rollers. Now you can eliminate on-the-job shutdowns for greasing. And you get longer life from rims, flanges, internal parts. The payoff . . . reduced replacement costs, savings in time.

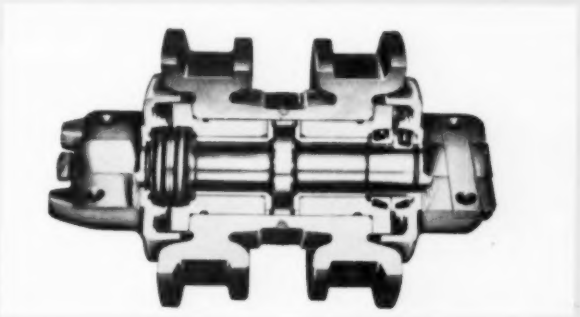
How maintenance is eliminated—the new Cat-built rollers are lubricated when first installed. They are equipped with floating ring seals that keep lubricant in . . . grit out . . . for the life of the rollers. Only when rollers are disassembled for rebuilding will relubrication be necessary. And the original metal rings can be reused.

New floating ring seal . . . only four parts, no springs. The roller seal employs two alloy metal rings and two rubber "O" rings. The metal rings, much harder than the best file steel, have lapped faces, smoother than glass. These faces taper slightly toward the inner edge forming a sealing area at the outer edge. As wear occurs, the sealing area moves gradually inward, maintaining a perfect seal for thousands of hours.



The "O" rings keep constant pressure on the metal rings. Lubricant can't get out. Grit can't get in. There are no springs or diaphragms to weaken, wear or become damaged. The "O" rings are made of special compound to resist oil, heat, cold.

Why do roller parts last longer? Grit is permanently sealed out. Big lubricant reservoirs (with strategically located oil passages) insure ample supply of lubricant to moving parts. Oil instead of grease is used for roller lubricant. Oil dissipates heat faster, circulates more freely than grease. These features assure you of longer shaft and bearing life. Longer bushings with extra-thick flange assures rigid support. Large sleeve bearings provide ample bearing area. Larger diameter, deep-hardened shafts withstand higher shock loads. Beam strength has been increased 63% for D6 shafts; 185% for D4 shafts. Resistance to side thrust is greatly increased in D4 shafts by a 25% wider center flange and 73% more thrust-bearing area.



Why do rims and flanges last longer? The new two-piece roller shell has greater strength and impact resistance. Special heat-treat process provides extra-hard and deep wear surfaces. Ample steel under tread gives strong support to resist shock loads. Thicker flanges combat peening over. Overlapping center joint maintains rigid shell without separate hub.

Easy installation is achieved by use of snap rings to hold the seals and end collars in place before mounting. End collar bolt holes will line up easily with track roller frame holes during installation.

Millions of hours of proof—the toughest track rollers yet. Cat lifetime lubricated rollers have been subjected to extensive and exhaustive on-the-job tests for over 5 years. Working on all types of job conditions, these time-tested rollers have proved to be unequaled. And machine-owner reports prove that Cat lifetime lubricated rollers can't be beaten for low-cost, minimum maintenance operation.

See your Caterpillar Dealer. He'll give you the full story on this time-saving, money-saving undercarriage component.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

SERVICE TIP: When rebuild time finally comes, be sure to keep the metal rings matched in original pairs, being careful not to nick or mar the lapped surfaces.

CATERPILLAR

Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

OFFERED AT REDUCED PRICES FOR PROMPT SHIPMENT AND SUBJECT TO PRIOR SALE

ITEM	SIZE CU. YD.	DESCRIPTION	WT.	REG. PRICE	REDUCED PRICE
1	3/8	• DRAGLINE BUCKET, COMPLETE Type AX, Medium Duty S	950#	$ 710	$ 600
2	5/8	• DRAGLINE BUCKET, COMPLETE Type BL, Light Duty PS	1200#	865	700
3	7/8	• DRAGLINE BUCKET, COMPLETE Type BM, Medium Duty PS	1750#	1190	1000
4	7/8	• DRAGLINE BUCKET, COMPLETE Type BM, Medium Duty S	1750#	1190	900*
5	2	• DRAGLINE BUCKET, COMPLETE Type BL, Light Duty PS	3200#	2175	1900
6	2	• HENDRIX DRAGLINE BUCKET, COMPLETE Type TS, Medium Duty P	3550#		1500*
7	2 1/2	• DRAGLINE BUCKET, COMPLETE Type BL, Light Duty PS	3850#	2600	2300
8	3	• DRAGLINE BUCKET, COMPLETE Type BL, Light Duty PS	4300#	2905	2500
9	3	• DRAGLINE BUCKET, COMPLETE Type BM, Medium Duty PS	4650#	3045	2350*
10	3 1/4	• DRAGLINE BUCKET, COMPLETE Type BM, Medium Duty S	5100#	3340	3000
11	3 1/2	• DRAGLINE BUCKET, COMPLETE Type BM, Medium Duty S	5550#	3610	2730*
12	4	• DRAGLINE BUCKET, COMPLETE Type BL, Light Duty P	5400#	3620	3200
13	4 1/2	• DRAGLINE BUCKET, COMPLETE Type BM, Medium Duty S	7650#	4970	4400
14	4 1/2	• DRAGLINE BUCKET, COMPLETE Type BH, Heavy Duty S	8600#	5505	5000

*Used buckets. All others are new. P — Perforated S — Solid

• List prices F.O.B. Evansville, Indiana Works. Subject to regular cash discount 2%, 30 days from date of shipment.

• When ordering, give size of dragline and hoist line so that correct sizes of rope sockets can be included.

• Immediate shipment subject to prior sale.

BUCYRUS ERIE®

BUCYRUS-ERIE COMPANY • Parts Division • South Milwaukee, Wisconsin

Bethlehem Rope on West Virginia Highway—Interstate 77 is an important link now taking shape in West Virginia's growing network of express highways. A north-south, 4-lane route connecting Parkersburg and Charleston, the new road will offer motorists a direct tie-in with the West Virginia Turnpike. This picture was taken recently during rough grading near the site of the Goldtown Interchange, near Sissonville, performed by Harrison Construction Company, Pittsburgh, Pa. Husky Bethlehem Wire Rope in various sizes is used here extensively, not only on drop-ball cranes, but also on draglines and shovels, scrapers, and bulldozers.

Bethlehem Steel Company, Bethlehem, Pa. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem Wire Rope

BETHLEHEM STEEL

News from the Field

Small Contractors Share in Road Program

A total of 4,022 federal-aid highway construction contracts was awarded through state highway departments during the first six months of 1959, involving a total cost of approximately $1.4 billion, Bertram D. Tallamy, federal highway administrator, announced recently. The figures were compiled by the Bureau of Public Roads, U. S. Department of Commerce.

The contracts awarded in the first half of 1959 had an average cost of about $350,000. They varied from less than $25,000 up to about $10 million. Thirty percent of the federal-aid highway construction contract low bids received by the state highway departments were for amounts less than $50,000. Another 19% of all contracts were for amounts between $50,000 and $100,000, and 22% were between $100,000 and $250,000.

About half the total number of contracts were in the range below $100,000, well within reach of small business enterprises.

The contracts in the first half of 1959 continued to fall mainly in the low and medium price levels, and progressively decreased in number as the large-size contract levels were reached. Contracts under $1 million accounted for 44% of the total contract cost involved, but represented 90% of the total number of contracts offered for bid.

Kolbe, Morris Elected to New Posts at United Electric Coal

Frank F. Kolbe was elected chairman of the board and John M. Morris president of the United Electric Coal Companies, Chicago, Ill., at a recent meeting

F. F. Kolbe

J. M. Morris

of the board of directors. Other officers elected were R. J. Hepburn, vice-president-operations; Thomas J. Tarzy, vice-president-sales; L. C. Sherrill, vice-president-St. Louis office; G. H. Utterback, secretary-treasurer; John T. Murray, controller; A. M. Foehrer, assistant secretary; and D. A. Ford, assistant treasurer. Elected by the board of directors to an executive committee were Irving Crown, Milton Falkoff, Frank F. Kolbe, John M. Morris and Frank Nugent.

Highway Cost per Mile Is Down

It costs less to build a typical mile of federal-aid highway now than it did during the first three months that the 1956 Highway Act was in effect, according to figures compiled by the American Road Builders Association. Contractors' bid prices have remained remarkably stable for the last several quarters despite generalized statements alleging soaring costs of the highway program.

Using 1925-29 costs as a base (100), the ARBA released comparisons for the third quarters of 1956 and 1959. Excavation costs were down 1.1 from 109.7 to 108.6. Cost of surfacing a typical mile fell from 180.3 in 1956 to 177.6 in 1959. The average cost of structures was down 13.4 to 247.1 in 1959. Composite of all costs was 167.2 in 1956, 163.4 in 1959.

P. H. Birckhead Retires

Peter H. Birckhead, a vice-president and director of Bucyrus-Erie Co., South Milwaukee, Wis., retired in December, closing out a 43-year association with the excavating industry.

Birckhead and his wife plan to move to St. Croix in the Virgin Islands.

Birckhead joined the company as a special apprentice in 1916, shortly after he graduated from Cornell University. He served with the U. S. Army Engineers and Chemical Warfare Service during World War I, and rejoined the company in 1919.

He became domestic sales manager in 1930 and general sales manager in 1934. In 1943, he was named vice president in charge of sales, and in 1952 was made a director.

In retiring from Bucyrus-Erie, Birckhead joins his brother, L. B. (Jack) Birckhead, Vero Beach, Fla., who retired in 1957 as manager of drill sales after 37 years with the firm.

New Garavaglia VP Named

Reorganization of Louis Garavaglia Contractors, Inc., has been completed with the appointment of Fredrick W. Neu as vice-president and general manager.

The need for reorganization developed when Louis A. Garavaglia, Jr., president, and Jule C. Garavaglia, vice-president, died as a result of a helicopter accident on March 24, 1957. In July 1957, the corporation employed James H. Marks, management consultant of Detroit, as acting executive vice-president to manage the business and plan and effect the reorganization.

Neu leaves the firm of Grove, Shepherd, Wilson and Kruge with principal offices in New York City. He had been employed by them for 20 years, during

Report on Opening of Bids by Size of Contract First Six Months — 1959

Federal-aid primary contracts (including interstate) and federal-aid secondary contracts

Size of Contract (Dollars)	Total Number of Contracts	Percent of Total Contracts	Total Amount of Low Bids	Percentage of Total Value
$0–24,999	630	15.66	$ 8,277,600	0.59
25,000–49,999	584	14.52	21,537,800	1.53
50,000–99,999	748	18.59	54,063,800	3.83
100,000–249,999	893	22.20	145,959,800	10.35
250,000–499,999	453	11.26	161,407,700	11.44
500,000–999,999	331	8.23	232,450,500	16.48
1,000,000–1,999,999	251	6.24	353,148,000	25.04
2,000,000–2,999,999	75	1.87	174,611,300	12.38
3,000,000–3,999,999	27	0.68	93,432,700	6.63
4,000,000–4,999,999	16	0.40	73,088,000	5.18
5,000,000–9,999,999	14	0.35	92,307,200	6.55
10,000,000–14,999,999	0	0	0	0
Totals	4,022		$1,410,284,400	

Source: Bureau of Public Roads—U. S. Department of Commerce

which he rose to a top management post.

Neu, 47, is a graduate civil engineer. His experience in heavy construction includes bridges, buildings, foundations and highways.

Oliver Mining Chief Dies

R. T. Elstad, 64, Duluth, Minn., a mining engineer who worked up to become president of U. S. Steel's huge Oliver Iron Mining Div. in northern Minnesota, died December 14 after a heart attack.

R. T. Elstad

Mr. Elstad graduated from the University of Minnesota in 1919, and joined the Oliver Div. as an engineer in the Canisteo district, on the west range of the ore-rich Mesabi. Later he spent seven years as an open pit mining engineer and seven more underground in the Chrisholm district.

In 1938, he joined Oliver's headquarters at Duluth as an assistant to the vice president. He served successively as assistant general manager, general manager and vice president before becoming president of Oliver in 1946.

Oliver operates ten open pit iron mines on the Mesabi range and two underground mines on the Vermillion range. The firm also has four large concentrating plants and three crushing and sizing facilities, as well as experimental taconite concentrating and agglomerating plants at Mountain Iron and Virginia, Minn.

Employment at Oliver's mines and plants last year was about 6,000.

Mr. Elstad was a director of the University of Minnesota Alumni association and had been a member of the Carlton College board of trustees since 1953.

He served as a director of the American Mining Congress and as a member of the board of directors at St. Luke's hospital in Duluth.

T. G. Paulsen Dies

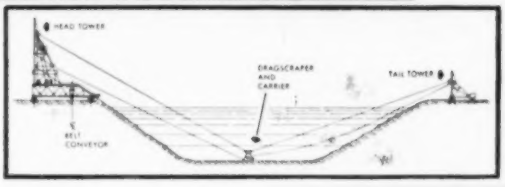
Thomas G. Paulsen, a service supervisor for Bucyrus-Erie Co., South Milwaukee, Wis., died of a heart attack in November. He was 45, and had no previous indications of illness.

In his post as service supervisor, commercial cranes and excavators, Mr. Paulsen was well known to contractors. He joined Bucyrus-Erie in 1936 as an equipment demonstrator and serviceman in the firm's former tractor equipment division.

Tough Digging, Long Hauls... Routine Jobs for Sauerman DragScrapers

240-Ft. Bank... 350-Ft. Haul

This mobile Sauerman Tower Excavator digs 480 yds. per hr. on an average haul of 350 ft. from a high bank to a portable field hopper. The 12-yd. Crescent DragScraper operates between steel head and tail towers. The towers are mounted on two sets of railroad tracks and ride on four sets of trucks. DragScraper power is supplied by two hoists mounted on the head tower. One hoist operates the load and pull-back cables, the other is used to tension the track cable. The hoists are controlled by one operator located in the cab on the tower. The load cable handles over 400,000 tons of material before replacement.



Drawing shows typical mobile tower excavator digging in wet pit.

75 Ft. Under Water... 800-Ft. Span

A 5-yd. rapid-shifting DragScraper supplies about 200 yds. per hr. to the plant hopper in background. Bridle tower in foreground is one of two supporting the bridle shifting cable which is controlled by the third drum of the Sauerman hoist. Lateral shifting of the DragScraper's line of operation is readily accomplished by power-shifting the trolley and tail block to a new position on the bridle cable. The DragScraper is digging 75 ft. under water and the operating span is 800 ft. from head frame to the bridle towers. Over a million tons have been excavated from this pit. The DragScraper often operates 24 hrs. a day to handle contract demands.

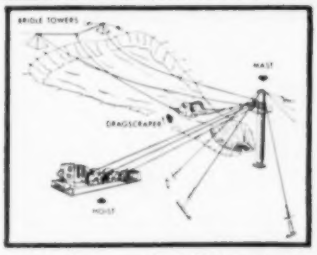


Diagram shows details of Sauerman rapid-shifting DragScraper.

Sauerman machines dig and haul in one continuous operation . . . work on high bank, dry pit or under water . . . handle most bulk materials. Consult Sauerman engineers about your job. We will promptly supply appropriate literature.

SAUERMAN BROS., INC. 622 SO. 28th AVE. BELLWOOD, ILL.

LInden 4-4892 • Cable CABEX—Bellwood, Illinois

Crescent Scrapers • Slackline and Toutline Cableways • Durolite Blocks

NEW! 30-YD CAPACITY

New Standards of

Plus the exclusive advantages of KON-TORK differential . . . a combination that means extra profit capacity for you—loading, hauling and spreading.

New 30-yd capacity . . . backed by 340 turbocharged horsepower gives you the size, the power and the durability to tackle any size job . . . I-system dirt, king-size dams, big state highway jobs.

The new *360* gives you more big-production features than any other big scraper, too: high-torque engine characteristics and snappy acceleration . . . full 90° steering . . . 10-ft apron lift . . . torque-proportioned traction . . . *plus* the new standards of all-hydraulic performance spotlighted at the right.

Get the full story on this all-new, all-hydraulic TS-360 from your Allis-Chalmers dealer now!

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

Everything you'd want in a big motor scraper if you were building it for your own jobs!

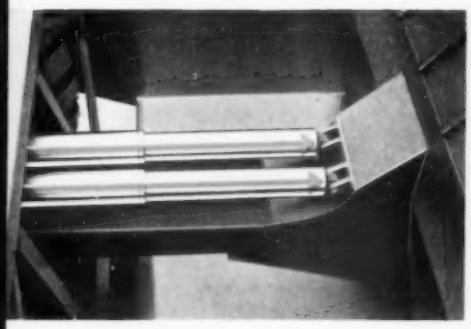
Double-acting bowl jacks put enough penetrating force on the cutting edge to pivot the *scraper and its load* clear of the ground.

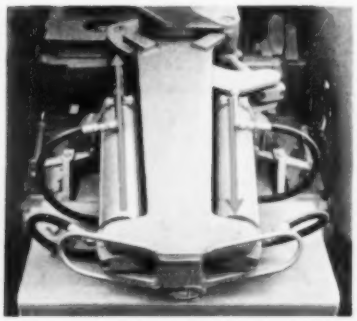
KON-TORK is an Allis-Chalmers trademark.

ALLIS-CHALMERS

TS 360

All-Hydraulic Performance





Twin telescoping cylinders provide smooth, forced ejection of any material . . . without "pumping" tailgate.

Double-acting steering jacks are fed by an *independent* hydraulic system . . . assure two-speed steering power to match any situation.

Kon-Tork differential automatically controls the distribution of torque to the drive wheels . . . for maximum traction to match any working condition.

move ahead with

ALLIS-CHALMERS

. . . power for a growing world

Equipment You Ought to Know About

Tandem Scrapers

Manufacturer: LeTourneau-Westinghouse Co., Department EE, Peoria, Ill.

Claims: Introduction of its new tandem scraper system is described by LeTourneau-Westinghouse as one of its most important developments in 10 years.

Tandems are currently available behind all three sizes of the company's two-wheel Tournapull prime movers, as well as with the recently introduced four-wheel Speedpull. Total capacities with the tandems range from 18 cubic yards in the D size to 56 yards in the model B.

Because of the tandem system's flexibility, it offers the contractor greater opportunity to economically tailor his machines to the requirements of the job. Throughout the L-W line, he can look at the equipment in an entirely new light. Instead of viewing a B Tournapull, for example, strictly as a B prime mover with 28-yd. scraper, he can look at it as a host of elements which can be used in various combinations to give him precisely the unit which best suits his need. He can have:

335-hp. B Pull and B scraper	28 cu. yds.
335-hp. B Pull and tandem 18-yd. C's	36 cu. yds.
335-hp. B Pull and tandem 20-yd. C's	40 cu. yds.
360-hp. B Pull and B scraper	28 cu. yds.
360-hp. B Pull and tandem 20-yd. C's	40 cu. yds.
360-hp. B Pull and tandem B scrapers	56 cu. yds.

Coupling or uncoupling the second scraper can easily be accomplished in 30 minutes or less. One hitch-pin forms the mechanical connection, while quick connect plug-ins provide the hook up for electric cables and air hoses.

One of the most important advantages in tandemizing is that the capacity doubling process does not call for a bigger more powerful pusher. Because the scrapers are loaded one at a time, loading resistance is about the same as it would be if there were only one scraper behind the prime mover. In loading time, the process of loading tandems is actually faster than if each scraper had its own power unit, because the time taken for the pusher to position for the second load has been eliminated.

According to D. K. Heiple, sales development manager for L-W, the idea of doubling-up scrapers in tandem for greater capacity is not new. Principal problems experienced with tandems in the past, he explained, were awkwardness and lack of maneuverability due to extreme length, plus the complication of running long reeves of cable from the rear scraper to a power control unit on the prime mover. The L-W system, he claims, eliminates both of these drawbacks.

Electric controls for the rear scraper, just like the ones on the front, transmit the power for tailgate, apron and bowl lift through electric cable eliminating the long runs of wire rope. The maneuverability problem was solved by dispensing with the front axle and wheels of the second scraper and letting it ride "piggyback" on the rear of the front scraper. This shortened the tandem's overall length and permits the second scraper to turn to full 90° in relation to the front scraper.

"Capacity-doubling" possibilities are open to the vast majority of owners of Tournapull scraper combinations already in the field. Almost all such electric control rigs built since 1947 can easily be tandemized. According to L-W engineers, the job can be done in the field at modest cost.

Equipment Lights

Manufacturer: Natale Machine and Tool Co., Department EE, 6 Orient Way, Rutherford, N. J.

Claims: A new 1050 series has been added to the Circle-D line of flood and spot lights. This light is designed to accommodate sealed beam lamps such as R-52, R-57 and R-40 long neck types.

Constructed of heavy cast aluminum alloy, the fixture resists corrosion and moisture. The double cushion lamp support protects against shock and vibration, and the globe is supported by a heat-and-cold-proof resilient ring gasket. This type of support also seals light against moisture, compensates for normal lamp tolerances and prevents lamp from becoming loose while in operation.

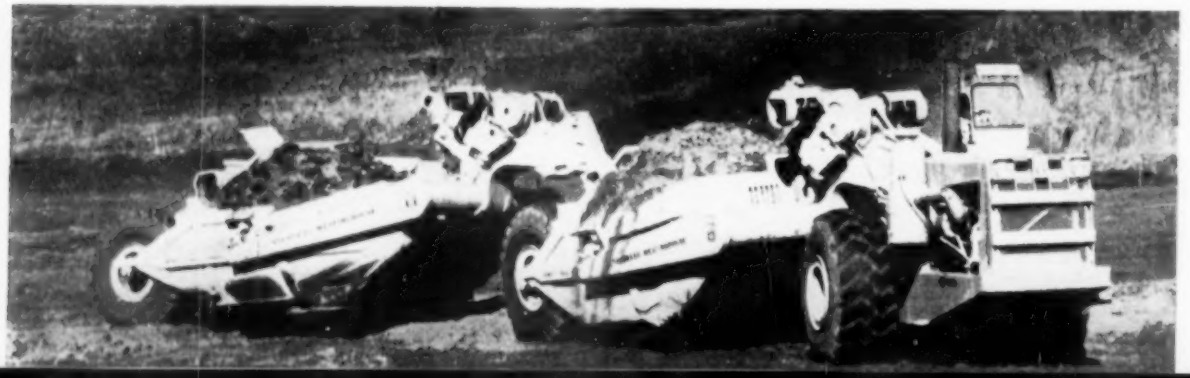
Although Circle-D lights are compact in size, their light output is comparable to lights two to three times as large. When pole mounted, lighter weight poles can be specified or more lights can be installed, giving greater light pattern flexibility.

The 1050 series lights are furnished in two models, high bay and standard model with a friction clutch, swivel arm for pole or trough mounting.

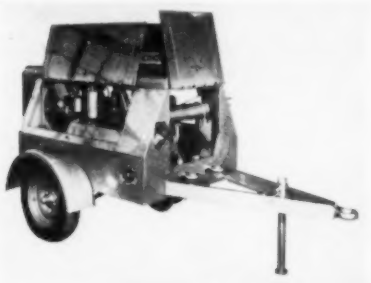
Rotary Compressor

Manufacturer: Gardner-Denver Co., Department EE, Quincy, Ill.

Claims: A new 85-cfm rotary portable compressor is described by Gardner-Denver as the most compact unit yet produced by the firm. The oil-air-cooled model RP85 compressor complements the company's line of portable compres-



sors ranging up to 900-cfm capacity. The new model is especially designed for jobs requiring limited air output and maximum portability. It is particularly suited to repair and construction work on roads, highways, sewers and utilities, and to shop maintenance uses.



Important features of the RP85 are: 1) compressor vanes can be easily removed, replaced or inspected; 2) inspection plates provide access to vital parts for periodic inspection and preventive maintenance; and 3) positive-metered oil flow assures lubrication, cooling and sealing.

Welding Kit

Manufacturer: Arcair Co., Department EE, P.O. Box 431, Lancaster, Ohio.

Claims: Arcair's new Weld Help kit is a sampling package of welding carbon plate, rod and paste. Through use of these items, welders can quickly become adept with these products and test their advantages on difficult welding work.

The kit contains eight diameters of carbon rods, three thicknesses of carbon plate, a can of carbon paste, a can of Protex surface protection compound and a well-illustrated manual showing some of the numerous applications.

35-Ton Rear Dump

Manufacturer: Euclid Div., General Motors Corp., Department EE, Cleveland 17, Ohio.

Claims: Euclid has added a new variable wheelbase machine to its line of off-highway rear dump haulers. Designated as the model S-18, this new Euc consists of an overhung engine type tractor with an Easton-built semi-trailer.

The S-18 tractor is powered by a GM 6-110 engine of 336 horsepower. It has an Allison 4-speed Torqmatic drive with converter lock-up; a Torqmatic brake is available as optional equipment. Top travel speed with full payload is 25 mph. Tractor and trailer tires are 27.00 x 33 and are interchangeable. For work requiring maximum traction and flotation, 33.5 x 33 tires are available as optional equipment.

Designed as a complete unit, the S-18 rear dump is well balanced and provides exceptional maneuverability for close quarter work in mines, quarries, industrial and heavy construction work. Full hydraulic steering enables the tractor to make full 90° turns . . . the complete machine makes a non-stop turn in 34 feet when in hauling position . . . with hopper raised, turning width is 28 feet 8 inches, since wheelbase is shortened by 6 feet 6 inches.

The model TS 2635 Easton trailer is constructed of high strength, heat treated alloy steels to withstand the impact and wear of heavy rock, ore and abrasive material. It has a struck capacity of 23 cubic yards. Heaped load is 26 yards, and rated payload is 70,000 pounds. A new single-stage double-acting hoist provides extremely fast and smooth dumping. The operator has full control of the body position through the entire dumping cycle. There is no sudden shock or impact when the body reaches its maximum height or returns to the travel position.

Wheelbase of the S-18 rear dump is 20 feet in hauling position. With body raised to dumping position wheelbase is shortened to 13 feet 6 inches. Weights are 67,000 pounds net, 137,000 pounds gross. Distribution of gross weight is 50% on both axles.

Since the tractor can be used with the Euclid S-18 scraper or the Easton rear dump, the conversion offers maximum flexibility for all types of work with a minimum equipment investment. Wheels, tires, brake drums and related parts are interchangeable from scraper to rear dump.

Tractor-Shovel

Manufacturer: J. I. Case Co., Department EE, Racine, Wis.

Claims: Biggest, most powerful model in the Case line of four-wheel drive tractor-shovels is called the W-12 Terraload'r. This new high-speed, high-production loader has a carry capacity of 9,000 pounds, and breakout capacity of 23,500 pounds. Its standard loader bucket is SAE rated at 2½ cubic yards. Optional buckets with capacities of 1⅝ and 3½ cubic yards are also available.

Patterned after Case W-9 and W-10 Terraload'rs, the new unit was designed around a Case 120-hp diesel engine that had been thoroughly field proved. The W-12 design, according to Case, inte-

Continued on page 50

New Equipment . . .

grates engine and tractor shovel into a single unit that is well balanced from the standpoints of both working stability and power-to-weight-to-torque ratios.

The W-12 has torque converter drive that automatically and instantaneously more than triples engine output torque to meet increasing loads. The W-12's constant mesh transmission provides speeds from 0 to 23 mph in either direction through three speed ranges. Other features include power transfer differential for all four drive wheels, power shift, power steer and power brakes. Control of the W-12 is hydraulic and use of large pumps provide extra-fast lift (7½ seconds) and dump (4½ seconds).

The new machine also features forward-pivoted lift arms which offer, says Case, several advantages. First, the operator gets 360° visibility, does not have the arms slicing by his ear while lifting or lowering the bucket. The forward pivots permit shorter arms for better balance and minimized tendency of machine to pitch or "nose-dive" when carrying loads. They also minimize effects of side thrust and though the arms are shorter, dump clearance is still a good 9 feet.

Another advantage, according to Case engineers, is that the front-pivoted arms permit application of direct force for digging to depths of one foot.

The loader bucket is easily interchangeable with a specially designed dozing blade, brush rake and V-type or angling snowplows.

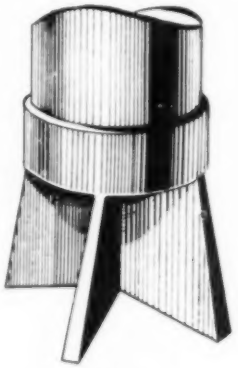
Pile Tips

Manufacturer: Foundation Specialists, Inc., Department EE, 295 Madison Ave., New York 17, N. Y.

Claims: A new concept in pile tips which will aid in the driving of all types of piles in construction work has been introduced by Foundation Specialities, Inc. The new FSI pile tips are designed to prevent "hung-up" piles, collapse and distortion, bending or dog-legging and clogging. The patented tips are available for use on closed-end piles, open-end piles, and H-beam bearing piles.

The FSI fin tip is a steel casting in the form of an inverted cone. On its circumference are integrally-cast, wedge-shaped, fin-like blades, extending below the vortex of the cone. These blades act as a drill to penetrate heavy layers of coarse sand, hardpan or decomposed rock. The fins will not slide off but imbed themselves in sloping rock.

The FSI fin tip for open-end piles is a steel casting in the form of two crossed blades at right angles to each other with cutting ends tapering inwardly. It is for use in areas where sloping rock is a major problem—the tip will readily seat itself in the rock preventing dog-legged piles. It can be had with square collar for H-beam bearing piles.



FSI FIN TIP
(for open-end piles)

The FSI ram tip is a steel casting in the form of two blades at right angles to each other forming a wedge-shaped cross at the base of the driving tip. The wedge-shaped blades disperse large boulders preventing them from lodging within the pile, allowing the pile to cut through dense materials. It is adaptable for closed-end pipe piles and mandrel driven shells.

The fin tip and the ram tip for use with both regular open-end and closed-end piles are stocked in sizes from 8⅝ to 14 in. O.D. The ram tip for H-beam bearing piles is available from BP 8 to BP 14. Larger sizes in all models may be placed on special order.

"OK, you win! Scoop up your winnings."

New Trade Literature

Subject: **Crawler-Mounted Loader**

Content: Unique features of the Koehring model 205 "Skooper"—a full-revolving, crawler-mounted front-end loader—are described in a two-color, 8-page bulletin. The new front-end loader, available with a rehandling, rock, or general purpose bucket, can load up to 400 tons an hour. Illustrations and captions describe various mechanical features—independent traction, hydraulic crowd and dump assembly, and standard cable hoist—and explain how the front-end loader's design cuts maintenance, operating costs and operator fatigue. A series of on-the-job pictures shows the machine at work in mining, excavating, stockpiling and pavement removing operations. Ask for bulletin K-636.

Where to get: Koehring Div., Koehring Co., Department EE, Milwaukee 16, Wis.

Subject: **60-Ton Truck Crane**

Content: A new 16-page catalog, describing the American 60-ton truck crane, shows pictures taken on large engineering projects and big lifts. The catalog describes and illustrates machine features.

Where to get: American Hoist & Derrick Co., Department EE, St. Paul, Minn.

Subject: **Wheel Tractors**

Content: A step by step explanation of how Caterpillar's SynchroTouch transmission control operates is included in new 8-page booklets on the 345-hp DW20 and DW21 series G tractors. Schematic drawings illustrate the sequence of events involved in "shifting" by dialing the desired gear. Maximum rimpull of 39,565 pounds for the DW20 and 49,250 pounds for the DW21, both higher than on previous models, are combined with the SynchroTouch transmission control to produce increased travel speeds 10 to 20% greater over similar haul road conditions. The new DW20 series G tractor is mated with either the No. 456 series B scraper (a 27-yd. capacity unit), or the No. 482 series B scraper (a 34-yd. heaped capacity unit). The DW21 series G tractor is mated with the No. 470 series B scraper, a 27-yd. heaped capacity pan. Both tractors can also be mated with four models of Athey trailers, giving them increased versatility. Ask for form 33613 (DW 20) or form 33614 (DW21).

Where to get: Caterpillar Tractor Co., Department EE, Peoria, Ill.

Subject: **Truck Crane Outriggers**

Content: A 4-page bulletin describes new hydraulically operated "Power-Set" outriggers available on Lorain Moto-Cranes. These are the first power operated outriggers to use curved beams with attached floats that move out and down simultaneously to automatically adjust to ground level. The bulletin describes how Moto-Cranes go from travel to ready-to-work position in 56 seconds, and make quick move-ups in 20 seconds. Other features covered are adjustments for crowded quarters or uneven ground and individual controls for each outrigger beam.

Where to get: The Thew Shovel Co., Department EE, Lorain, Ohio.

New Movies . . .

Subject: **Truck Movie**

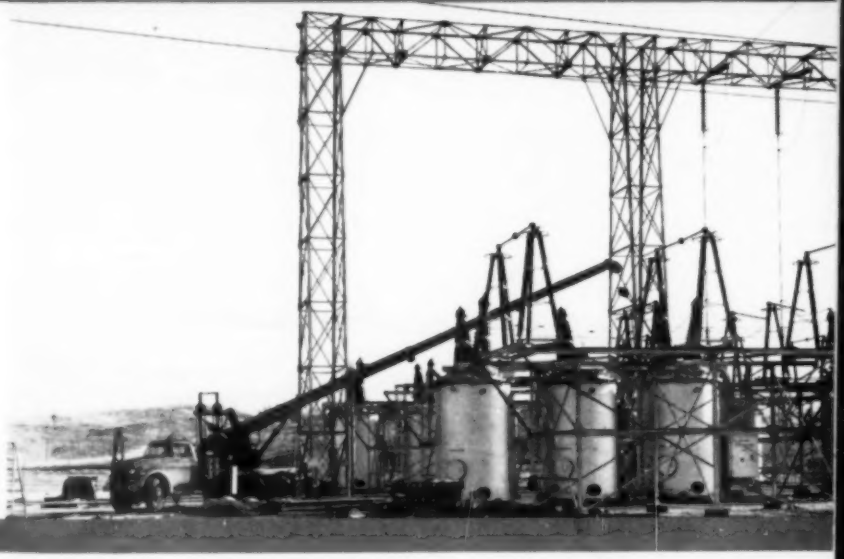
Content: *Revolution on Wheels* is a new full-color 16mm sound movie about the Haulpak off-highway truck. Haulpak is the name of L-W's line of 27, 32 and 80-ton haulers. Illustrating features of the line, the 15-minute movie shows units working on job locations around the country. Scenes include a midwestern limestone quarry; a western open-pit mine; and an eastern highway relocation job. The Haulpak's mechanical features are shown with diagrams and blueprints showing what makes it "tick." One scene shows what happens when the Haulpak's front end, suspended five feet above the ground, makes a sudden drop.

Where to get: L-W distributors or Le-Tourneau-Westinghouse Co., Department EE, Peoria, Ill.

FOR 50 YEARS...
Finest in the Field!
Rely on the bucket contractors rely on. The Omaha Dragline Bucket gives full load with every cast. Perfect balance makes it easy to spot dump. Alloy steel cutting teeth stay sharp, tough and ready. Strike pay dirt now! Complete information and specifications await your letter.
DRAKE-WILLIAMS MOUNT • OMAHA, NEBR.
OMAHA
DRAGLINE BUCKETS

...gentle enough
to just crack an egg

...precise enough
to work in the hot spots



...speedy enough
to beat schedules on production digging jobs

THE HYDROCRANE'S OIL-SMOOTH CONTROL gives you unbelievable precision and accuracy handling light or heavy loads. That's because there are no gears to jog, no dogs to drop into place, no sudden, jerky control movements. Yet you're talking about a husky crane that handles loads up to 24,000 pounds!

The HYDROCRANE BOOM TELESCOPES to let you get into hot spots that most other cranes simply can't reach. The telescoping action of the Hydrocrane boom works on the move, too, without stopping to pull pins, or add sections. That means you can make your pick in close, hoist the boom, and reach out far to spot the load where you want it. And you are talking about a crane that can reach up to 70 feet high with a jib!

The HYDROCRANE HOE attachment is a profit-making production tool because it, too, is in a class by itself. You get hydraulic-controlled wrist action at the dipper to pry out toughest material, fill faster. You can *reverse* the dipper and dig away from the machine. You can also telescope the boom to extend the reach of the Hydrohoe even farther. And this is a half-yd hoe that will *dig* at 18-ft depth!

The Hydrocrane
Is No Run-Of-The-Mill Crane!

You owe it to yourself to learn the facts about this proved machine. It *is* different . . . in a way that can make a big *extra* in your profit picture. For eye-witness proof, watch a demonstration. Your Bucyrus-Erie distributor will be pleased to arrange it without obligation. Call him today for full details, or write Bucyrus-Erie Company, South Milwaukee, Wisconsin, Dept. 25H59.

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TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

HEAVY EXCAVATION EQUIPMENT
DRAGLINES SHOVELS, CRANES,
DRILLS, TRUCKS

15-W B-E elec. drag, 215', 12-yd.
450-W B-E diesel drag, 165' with extra 10, 12, 13 and 14-yd. buckets.
9-W B-E elec. drag, 165', 10-yd.
9-W B-E diesel drag, 165', 12-yd.
7-W B-E diesel drag, 140', 7-yd.
7400 Marion diesel drag, 175', 13-yd.
7400 Marion elec. drag, 175', 12-yd.
625 Page diesel drag, 160', 9-yd.
621-S Page diesel drag, 125', 7-yd.
200-W B-E diesel drag, 125', 6-yd.
5-W B-E diesel drag, 100', 6-yd.
2400 Lima dragline, 130', 5-yd.
4500 Manitowoc drag, 120', 5-yd.
120-B B-E elec. drag, 115', 5-yd.
1900, 3500, & 3000 Manitowoc cranes.
111-M Marion drag, 100', 4-yd.
1601 Lima 4-yd. shovel/drag.
1055 P&H drag, 80', 3½-yd.
1201 Lima dragline, 85', 3-yd.
54-B B-E drag, 80', 2½-yd.
5560 Marion 26-yd. elec. shovel.
5480 Marion 18-yd. elec. H. L. shovel.
151-M Marion 7-yd. elec. shovel.
170-B B-E 6½-yd. elec. shovel.
4161 Marion 6-yd. elec. shovel.
2400 Lima 4½ and 5½-yd. H. L. Shovels.
120-B B-E 4-yd. elec. shovel.
111-M Marion 4-yd. standard shovel.
1201 Lima 3½-yd. standard shovel.
54-B B-E 2½-yd. standard shovel.
Model T-650 Reich drill, truck mounted, rotary and down-the-hole.
Joy Truck mounted rotary air drill, 6" holes.
Ingersoll-Rand truck mounted Drillmaster.
Dixie model CD-10B pontoon dredge.
Euclid trucks, truck cranes, dozers, attachments.

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l Bank Bldg.
Hazleton, Pa.
GLadstone 5-3658

Near New
Model 71-B Bucyrus-Erie
Crane (60-Ton)
Used one job only—Less than 500 hours—

Actually like new
160-foot boom—40-foot jib
Adaptable to 3-Yd shovel front or 3½ to 4-yd. bucket as dragline.

Special
Laced tubular cord angle boom
Rigid gantry and counterweights

S/N 118536, powered by model 6230G-RD GMC diesel engine—Series 6-110, crawlers 16' 9½" x 36". For further information, contact

FISHER CONTRACTING CO.
Attn: Jack E. Brown
P. O. Box 6303 Phoenix, Ariz.
Phone: AL 8-7741

1—Bucyrus-Erie model 175-B dragline, electrically driven with 125 foot boom and 5-yd. bucket. Travels on rails and mats. Considerable spare parts also available. Contact Mr. J. N. Becker, at

POLK EQUIPMENT CO., INC.
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Bucyrus-Erie walking draglines, 450-W diesel, 15-W electric, (England) 12-14 yds.
Washington 50-ton Whirley gantry crane.
Dredge, hydraulic, heavy duty, 18", diesel.
Locomotives, diesel, 30, 44, 65, 80 tons.
Derricks, stiffleg, guy, 20 to 100 tons, (7).
Concrete batching-mixing plants (3).
Locomotive cranes, diesel, 25, 30, 40 tons.
Buckeye 260 trencher, with wide rotary.
Large shovels, cranes, diesel engines.

H. Y. SMITH CO.
828 N. Broadway Milwaukee, Wis.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

Hoes

1—Michigan C-16 ½-yd. hoe, ½-yd. 22" bucket, 9'9" crawlers, 20" wide, Hercules gas engine 1XD #1742230, machine #3797, 4 yrs. old.
1—Koehring 303—¾-yd. hoe, 30" bucket, 10'6" crawlers, 24" wide, Waukesha gas engine #484150, 4⅜"x5¼", serial #2337.
1—Osgood 200-½-yd. hoe with 22" bucket, 11' crawlers, 22" wide, powered by Continental gas engine, machine #6285, 5 years old.
1—Lorain model TL-20 hoe, with Waukesha gas engine, six years old, good condition.
1—Unit model 614 dragshovel, ½-yd. bucket, 20" pads, GM diesel engine 2055, excellent condition, 4 years old, serial #54308.

Air Compressors

1—LeRoi 315 air compressor on 4 pneumatic tires, 7 or 8 years old.
1—Joy model WK-80, size 105 portable air compressor with gas engine.
1—Gardner-Denver 105 cfm, 2 stage water cooled air compressor, Hercules OXD-5 gas engine with electric starter on 2 pneumatic tired wheels, serial #162853.

Misc.

1—Bucyrus-Erie 15-B ½-yd. shovel attachment perfect.
1—Wiley PM215 Patchmobile portable asphalt patching unit on two pneumatic tires, complete with rotary dryer. This unit is new.
1—Ruhr M-1 ½-yd. heavy-duty grapple, new excellent buy.
1—Wayne 36" rider industrial vacuum pick-up power sweeper, demonstrator, 2 years old.
2—CMC Jeteretes with all accessories. Excellent condition, practically new with all extra accessories.
1—Ross 6-ton pneumatic-tired fork lift truck, 10' mast, 14' lift.
1—Used Kennedy Van-Saun revolving scrubber washer screen, 48" dia. x 21'0" long, in excellent shape and complete with all new parts including extra scrubber sections and new sizing screens.
1—Ford 1956 F-600 stake body truck, serial #F602X14988, air brakes, heavy duty dump hoist, 2 speed rear and oversize motor.
1—Vermeer crawler trencher 12"-24" trench, Wisconsin 4-cylinder gas engine.

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Model 604 Lima 1½-yd. dragline, equipped with 80' pendant suspended boom, dragline fairlead, long wide crawlers, Cummins diesel engine. Delivered new in 1951. Excellent operating condition. Priced at $22,500 with no trades.

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EV 4-1900

P&H model 955-A 2½ c. y. Waukesha engine, mod. 6 WAKD combination dragline, shovel and crane. Serial #20077—$42,000.

WINSTON-GREEN-DRAKE
Box 54 Pierre, S. D.
CApitol 4-5804

1—Northwest model 25 hoe.
1—Model H Scoopmobile, hydraulic loader, ¾-yd., 1955 model, excellent condition.
1—Model C Scoopmobile 22' tower, pallet fork or bucket, excellent condition.
1—Model 41 Lorain ¾-yd. shovel with Cat D4600 engine, 1945 model.
1—Model 10-20 Unit crane mounted on Dart truck, excellent.
2—365-ft. Gardner-Denver air compressors, good.
1—1½-yd. Kiesler clamshell bucket-rehandling. Like new.
1—HD-20 Allis-Chalmers with push plate.
1—Model 300 International utility tractor with Wain-Roy hoe. 1956 models, both in very good condition.
1—Esco ¾-yd. orange-peel bucket. Excellent.
1—365-ft. LeRoi air compressor, 1956 model, P&H diesel engine.
1—25-B Bucyrus-Erie. Good throughout.
1—K-12 Insley dragline w/35' boom. Located our branch Springfield, Mo.
1—22-B shovel front. Very good.

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620 E. 18th St. Kansas City, Mo.

Shovels, Cranes, Backhoes From Our Rental Fleet—Bucyrus-Erie

Model 51-B crane, long and wide tracks 100' boom, 20' jib, pendant suspension, 2-speed independent propel. Powered by Buda model 6D6B diesel engine. Crane in like new condition—very little use. Replacement cost $81,466. Price FOB Louisville, Ky., $69,000.

Model 38-B, 1½-yd. dragline with long and wide track, 11'6" wide, 7'5" long, 33" pads, 70' boom, pendant suspension, unit 79 extra counter weights. Powered by IHC model UD1091 diesel engine. Total weight 109,360#. Replacement cost $60,915. Like new condition, 4 months of rental service is all this dragline has been used. Price FOB Louisville, Ky., $49,900.

Model 22-B heavy-duty, dragline, clamshell, 60' boom pendant suspension, lifting crane, long and wide tracks, extra counter weights, 30" treads. Powered by IHC UD-525 diesel engine. Replacement cost $34,399.60. Price FOB Louisville, Ky., $24,500.

Model 22-B, ¾-yd. capacity, basic machine. Powered by IHC model UD-525 diesel engine. Less than 3 years old. Excellent condition. $19,100 FOB Louisville, Ky.

Model 22-B, ¾-yd. hoe, dragline combination. Powered by IHC model UD-525 diesel engine. Less than 3 years old. Excellent condition. Price FOB Louisville, Ky., $19,100.

2—Booms 35' from our rental fleet, like new condition, for above 22-Bs. Price FOB Louisville, Ky., $950 each.

1—Hoe attachment like new condition for above 22-Bs. Price FOB Louisville, Ky., $2,800.

Write, wire or phone Jim Waddell.

BRANDEIS MACHINERY & SUPPLY CO.
P. O. Box 1705 Louisville 1, Ky.
MElrose 7-4741

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

LeTourneau model G6 cable operated scraper, serial No. 45-65, 6-yd. capacity, equipped with 10:00 x 20, 12-ply tires, front and rear. Fair condition. $1,750.

Caterpillar model D6, 74" diesel tractor, serial 9U-371, equipped with 6 roller non-oscillating track frame, large front idlers, 16" wide grouser tracks, Caterpillar model 46 front mounted hydraulic control unit, Trackson model AF-6 hydraulic angling blade bulldozer, Trackson model MD-6 pipelayer, complete with 14' boom and snatch block. Very good condition. $12,500.

International model TD-14, 74" diesel tractor, serial No. TDF-21658T2, equipped with 20" grouser tracks. Cardwell hydraulic angle blade bulldozer, Cardwell model PBI-14 pipelayer, hydraulic system repaired, pipelayer completely checked. Fair condition. $5,500.

International model TD-14 diesel tractor, serial No. TDF-20852T2, equipped with Cardwell model PBI pipelayer, serial No. PBI-14-294, with counterweight, less boom, 20" grouser tracks, crankcase guard. Machine in fair condition. $3,700.

Caterpillar model D8 diesel tractor, serial No. 2U-9403, equipped with Trackson model MD8 pipelayer, counterweights, crankcase guard. Tractor in fair condition. Location Dodge City, Kan. $9,500.

Caterpillar model D8 diesel tractor, serial No. 2U-6546, equipped with Trackson model MD8 pipelayer, crankcase guard, electric starting. Tractor in fair condition. Location: Dodge City, Kan. $9,500.

Caterpillar model D8 diesel tractor, serial No. 2U-7940, equipped with Trackson model MD8 pipelayer, electric starting, counterweights, crankcase guard. Location: Dodge City, Kan. $9,500.

Caterpillar model D8 diesel tractor, serial No. 2U-4875, equipped with Trackson model MD8 pipelayer, counterweights, electric starting, crankcase guard. Machine in fair condition. Location: Dodge City, Kan. $9,500.

Caterpillar model D8 diesel tractor, serial 1H-8819SP, equipped wth Trackson model MD8 pipelayer, complete with 18-ft. boom with snatch block, track roller guards. This tractor in good running condition, having been cleaned and painted. $8,000.

Hyster model D8N worm drive winch, serial WHN-72592, complete with power take-off shaft control levers, operator guard. Good condition. $2,250.

Hyster model D8N worm drive winch, serial No. WHN-45814, equipped with cable, power take-off shaft, controls, fairleads. This winch in good operating condition. $2,300.

Bucyrus-Erie model 54-B shovel & crane combination, serial No. 77778, mounted on 30" standard flat pads, equipped with 80' crane boom, 20' jib, shovel front with 26' boom, 18' handle, 2½-yd. dipper, high gantry, running boards, counterweight, powered by Buda model 6DC-1879 diesel engine, serial No. 36869-F with electric starting, also has a Kohler light plant for electric lights. Good condition. Location: Grants, New Mexico. $33,500.

Bucyrus-Erie model 54-B crawler shovel, serial 58882, powered by Buda model 8DAS-1125, diesel engine equipped with Torcon model 3-17CR torque converter, 26-ft. boom, 18-ft. handle, 3-yd. Esco dipper, low gantry, mounted on standard 36" flat pads. Good condition. $32,500.

Bucyrus-Erie model 20-B crawler shovel dragline combination, serial No. 16049, mounted on 20" flat narrow cats, equipped with 18'0" boom, 14'6" handle, ¾-yd. dipper bucket, used Bucyrus-Erie unit 1A dragline equipment including 35-ft. crane boom sheaves, rotating fairlead, digging & hoisting ropes, power boom hoist rope. Price on application.

Bucyrus-Erie model 10-B shovel hoe combination, serial No. 72711, powered by Buda model 6B-273 gasoline engine, with electric starter, mounted on 14" flat pads, equipped with 13'0" shovel boom, 11'0" handle, ¾-yd. dipper bucket, 15' straight boom backhoe attachment, ¾-yd. dragshovel bucket. Fair condition. $4,750.

R. L. HARRISON CO., INC.
P. O. Box 1320 — Albuquerque, N. M.

Model 2460 Warner & Swasey Gradall excavator. Delivered new in 1957, equipped with GMC diesel engine, 24" and 36" buckets and ripper tooth. In good operating condition. Priced to sell.

J. P. WAITE CONSTRUCTION CO.
3304 W. Pierce St. — Milwaukee, Wis.
EV 4-1900

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

⅜-Yd. Shovel, Hoe & Crane

Hansen model 31 crawler hoe, International UD-6 diesel engine. Price includes shovel and crane attachments. A bargain. U-32. Make an offer.

½-Yd. Shovels, Hoes & Draglines

Austin-Western Badger shovel and hoe. International UD-9 diesel engine. Good operating condition. FOB Idaho Falls, Idaho. U-116. Make an offer.

Unit model 1020 excavator, S/N 1719. Price includes crowd shovel, dragline bucket, hoe attachment. Engine overhauled. Has extra engine and machine parts. Good condition. FOB Idaho Falls, Idaho. U-249. Make an offer.

Link-Belt Speeder model LS-52 crowd shovel. Cat D315 diesel engine. Very good condition. U-276.

Bucyrus-Erie crowd shovel attachment for model 15-B excavator. Very good condition. Make an offer.

Link-Belt Speeder attachments for models LS-50 or LS-51. Non-revolving fairlead attachment, like new. U-494. 30' dragline boom, excellent condition. U-496. ½-yd. shovel attachment, like new. U-497.

¾-Yd. Hoes—Crowd Shovel Attachment

Bucyrus-Erie model 22-B, S/N 117315. Has straight hoe boom. Powered by International UD-525 diesel. Excellent condition. U-463.

Bucyrus-Erie model 22-B S/N 115964. Cambered type hoe boom. International UD-525 diesel engine. Excellent condition.

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Bucyrus-Erie model 30-B crowd shovel. Crawler mounted. Powered by GMC 4057C diesel engine. Excellent condition.

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Bucyrus-Erie Model 37-B crowd shovel. Powered by Cat D13000 diesel engine. Fair condition.

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½-yd. capacity dragline buckets. Good condition. U-142.

Wellman 2½-yd. dragline bucket, model DXL. Has never been used.

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22-B Bucyrus-Erie S/N 119048 combination 40-10 hoe, Cat diesel, long wide cats, 24" dipper, padlock ⅞-yd. 35" dipper, side cutters.

HD-6G Allis-Chalmers S/N HD-6G-8001 diesel crawler tractor equipped with model TS-6 tracto-shovel, standard track, hour meter, fuel oil press. gauge, heavy-duty truck wheels.

Model VR28W Essick vibrating roller with carrying hooks, powered by Wisconsin model AKN air-cooled gasoline engine.

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Koehring model 304, ¾-yd. shovel, crawler mounted. Powered by International model UD14A diesel engine. Good operating condition. Price FOB Elizabethtown, Ky., $5,500.

P&H model 255A, ¾-yd. shovel, crawler mounted, 1956 model. Powered by Caterpillar model D315 diesel engine. Price FOB Elizabethtown, Ky. $14,500.

Lorain model 40, ¾-yd. shovel, crawler mounted. Powered by Waukesha 6MR gasoline engine. Shovel is in operating condition. Price FOB Elizabethtown, Ky., $4,500.

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2—38-B shovel attachments.
1—Osgood hoe attachment for Osgood 200.
2—22-B shovel fronts.

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2—Caterpillar DW20 scrapers. You will want to check the price and condition of these machines if you are in the scraper market.

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3—LeTourneau Super C Tournapulls. Tires range from fair to good. These machines are all capable of operating. Located at Casper.

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1—American Grader model 800, very clean. $1,500.
1—Woods Roadmixer model 54, P.T.O. for D8.
1—Buda engine model PCD, connected to Westinghouse generator 150 KW.
1—Seaman Andwall Pulvir rotary tiller.

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Bucyrus-Erie 22-B dragline.
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American ¾-yd. shovel & backhoe.
Pioneer 40" x 20" portable roll crusher.
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MISCELLANEOUS EQUIPMENT

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1—Slightly used ditto—serial 68232—$400 f.o.b. South Milwaukee, Wis.

1—Unused Buda diesel closed type power unit model 6BD-230 6-cyl. 3⅞ x 4½" serial 90634 with PTO—suitable for 22-T, 24-L, 24-W, 27-T, $1,500 f.o.b. South Milwaukee, Wis.

4—Unused Buda gasoline engines model 6B230 6-cyl. 3⅞ x 4½" serial Nos. 374640—374641—375110—375112 with PTO—suitable for 10-B, 22-T, 22-W, 24-L, 24-W—$750 each f.o.b. Erie, Pa.

1—Unused IHC gasoline closed power unit model U-164 4-cyl. 3½ x 4¼" serial 2982-BEL-Q54—suitable for 21-W, 22-W, 22-T, 23-P, $500 f.o.b. South Milwaukee, Wis.

1—Unused Buda gasoline engine model 6B273 6-cyl. 3¼ x 4½" serial 374583—suitable for 10-B, $500 f.o.b. Erie, Pa.

1—Used Hercules gasoline engine model GO-298 6-cyl. 3¼ x 4½" serial 3301201—suitable for 15-B—approx. 500 hours operation—$400 f.o.b. Erie, Pa.

1—Slightly used Buda gasoline engine model HP-326 6-cyl. 3⅛ x 4¼" serial 363846—PTO and pulley—structural base—suitable for 22-T, 27-T, 29-T, 60-L—$500 f.o.b. South Milwaukee, Wis.

1—Unused Caterpillar diesel engine model D311 4-cyl. 4" x 5" serial 758791—#2 SAE flywheel—gasoline starting engine—suitable for 27-T, 29-T, $1,500 f.o.b. South Milwaukee, Wis.

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1—Unused Waukesha natural gas—gasoline closed power unit model 6WAKU 6-cyl. 6¼ x 6½" serial 132702 with ICK starting engine—suitable for 48-L, $3,500 f.o.b. South Milwaukee, Wis.

1—Unused Waukesha diesel closed power unit model 6WAKDU 6-cyl. 6½ x 6½" serial 124921—ICK starting engine PTO with pulley suitable for 48-L—$4,200 f.o.b. South Milwaukee, Wis.

1—Unused Waukesha gasoline starting engine—Model ICK—4-cyl. 2½ x 3⅛" serial 1029495—$400 f.o.b. South Milwaukee, Wis.

1—Used Cummins diesel engine model LRI-600 6-cyl. 7¼ x 10" serial 89420—suitable for 88-B—f.o.b. San Francisco, Calif.

Above engines offered "as is," f.o.b. the indicated locations, subject to withdrawal or prior disposition.

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MISCELLANEOUS EQUIPMENT

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Adnun blacktop paver. Excellent machine for laying stabilized base mix. Has been repaired and is in good condition. U-5. A bargain. $1,400.

Barber-Greene model 879-A asphalt finisher. LeRoi gas engine. Lays 8' to 14' strip. Has been completely rebuilt and is in excellent condition.

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IHC TD-9 tractor cab. Excellent condition. U-76. $100.

CAT D-4 tractor cab. Excellent condition. U-77. $125.

IHC TD-20 tractor canopy. Excellent condition. U-309. $375.

IHC TD-24 tractor cab. Windows new. Excellent condition. U-376. $750.

Crushers

Cedarapids portable crusher and screening plant. 18x36 variable twin jaw crusher mounted on semi-trailer with fifth wheel pin. Overall dimension, 41'x8' wide and 12' high. 4'x10' vibrating type scalping screen, 27' long x 30" belt discharge conveyor. IHC UD-24 power unit is skid mounted and has outboard bearing. Overall condition is very good. U-389.

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Cleveland "Baby Digger" wheel ditcher. 4½-ft. digging depth. Hercules gas engine. Good working condition. U-1. Make an offer.

Barber-Greene model 702 trencher with 5" cutting bits. Wisconsin gas engine. Rubber tire mounted. U-372. Bargain price. Good condition.

Parsons model 88 trench liner. 7" paddles on chains, 14" paddles on extra chain, gas engine. Good condition. FOB Idaho Falls, Idaho. U-373.

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75KW Palmer generator set powered by International UD-24 110-220-440 volt, 3-phase, 60-cycle at 1200 RPM. Complete with skid mount. Good condition.

150 KW Westinghouse generator set powered by Chicago Pneumatic model CP-68 diesel. 187 KVA. 480-volt, 3-phase, 60-cycle. Complete switch panel. Good condition.

300 KW Columbia electric generator set powered by Cat model D-397. 240-480 volt, 3-phase 60-cycle at 1200 RPM. 372 KVA. Includes all switch gears and control panels, etc. Less radiator. Very good condition.

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Euclid model 8 LD rear dump truck, S/N 8956. 19-yd. water-leveled HD rock body. Cummins supercharged HBS 6-cylinder diesel engine. Fuller transmission. Motor is rebuilt and like new. General condition is good. Very reasonable price. Have 4 other Euclid trucks of similar description available for sale or rental—models 5 LD, 3 LD and 8 LD.

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LeTourneau model J-8 scraper, 10-12 yds. Fair condition. A bargain.

LeTourneau model WE 15-18 yd. struck, pull type scraper. Fair condition. U-471.

Misc.

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P&H model 150 backhoe, serial #13833 with gasoline engine, 20" dipper and ½-yd. dipper. Good operating condition. $3,500.

P&H model 255A cambered boom backhoe, serial #14436. Excellent value. $5,500.

Northwest model 25, serial #16381 backhoe. ¾-yd. Amsco bucket. Caterpillar D318 diesel engine. Reconditioned and ready to work. $16,750.

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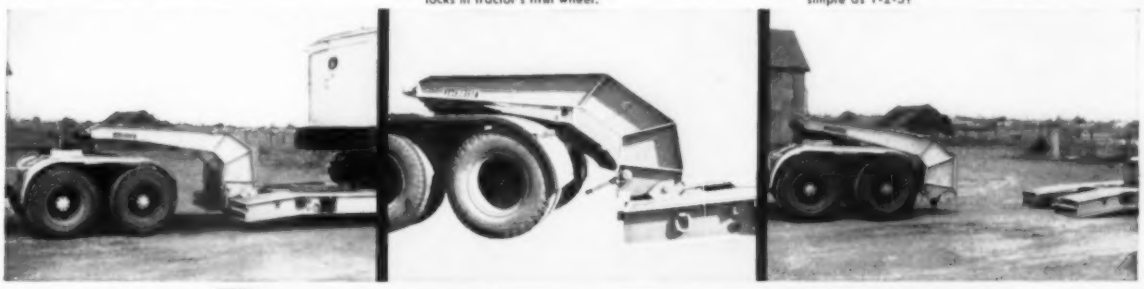

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